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THE TRIPLE ALLIANCE: HEART, KIDNEY, AND ARTERIAL DISEASE*

BY OSKAR KLOTZ, M.D.

Pittsburgh, Pa.

THE simultaneous presence of chronic heart, kidney, and arterial disease is not so uncommon in individuals above middle age. It does not make its appearance in the same characters in the different cases, but when more closely analyzed clinically or studied pathologically, we find similar earmarks of disease in each of the three organs. At times the condition of the heart, at others the finding of Bright's disease, or it may be the sudden development of cerebral conditions, calls our attention to the particular system, suffering the greatest strain, and we are apt, erroneously, to refer to that organ as the sole region of disease. These combinations of heart, kidney, and arterial disease, or any two of them, are most commonly brought to our attention when the process, from a pathological point of view, has become chronic. In no way do we face an acute lesion of an organ, but only the manifestations of a process insidiously progressive, and clinically recognizable late in its development. A correlation of the many facts bearing upon the condition which I have termed the triple alliance, is, I believe, possible.

A physiological alliance has been recognized as existing between the heart, arteries, and the kidneys. The proper function of each is, to some extent, dependent upon the healthy activities of the others. The relationship is perhaps more prominently brought out in the dependence of the function of the kidney as related to the

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For discussion see page 158.

heart, while a similar relationship also exists between the heart and the circulation in the arteries. To a great extent this relationship centres around the question of blood pressure within the arteries. It is realized, too, that this blood pressure is normally altered with great ease and that the alteration is observed by a greater or less response in all of these organs. From the recognition of the physiological interdependence of the activities of this group, have proceeded the theories that many of the pathological processes arising in any one, have their explanation in changes occurring in one or both of the other organs.

The lesions which we recognize in heart, kidney, and arterial disease, are of the character of sclerosis in each. The heart is hypertrophied, mainly in its left ventricle, and shows areas of sclerosis throughout its musculature. The arteries are thickened with more or less distortion of their lumina, although the altered calibre may not be referable to intimal sclerosis. The kidneys are small and fibrosed, showing characters that we readily classify as chronic interstitial nephritis. In the fully developed cases of heart, kidney, and arterial disease, the fibroses of these organs are marked, though the relative extent of the cirrhotic change differs in each case, sometimes being most marked in the heart, at other times showing an unusual arterial sclerosis or, again, having marked chronic interstitial reactions in the kidneys. Because of the variation in the quantitative deposition of fibrous tissue there has been much speculation in suggesting the disease or the organ which was primarily at fault.

Bright and subsequent pathologists recognized the association of the contracted kidney with morbid changes in other parts of the body, particularly in the presence of hypertrophy of the heart. It was generally believed that the kidney was the organ primarily affected and that other bodily conditions were secondary.

The hypertrophy of the heart has been explained on a purely mechanical basis as due to the difficulty of the circulation in the cirrhotic kidneys. Ewald and, later, Loeb have suggested that the heart lesions were the result of increased work brought about by the greater viscosity of the blood. Others (Hasenfeld and Hirsch) have found that the cardiac hypertrophy was associated particularly with a sclerosis of the splanchnic vessels while sclerosis in the remaining portion of the peripheral tree, they believed, had less effect.

In the belief that the kidney was primarily involved in disease and was followed by the retention of a variety of products of meta-

bolism, it was held by some that both the heart and arterial lesions were the result of a chemical irritation. The retained substances, it was claimed, had a direct effect upon the musculature of the heart as well as upon the arteries. It was also suggested that besides this the direct toxic effect of the retained excretions caused a persistent high blood pressure induced by arterial spasm. More recently it has been suggested that chronic kidney disease is accomplished by an abnormal function of the adrenal glands, associated with a greater production of adrenalin. This, it is claimed, leads to a tonic spasm, or contraction of the arterial walls, materially raising the blood pressure to which the cardiac hypertrophy is a response. Thus a variety of factors have been suggested as initiating the hypertrophy of the heart secondary to other diseases.

Even under the circumstances where cardiac hypertrophy is recognized clinically, the heart condition may not have reached the final stage of the process. Insufficiency of the myocardium may yet develop, particularly in the presence of a subsequent disease, as myocarditis, or with a progressive sclerosis of the coronary arteries. These changes, however, are rather to be viewed as complications and sequelæ which do not assist in clearing up the nature and process of the primary disease causing the hypertrophy.

Undoubtedly, when a definite sclerosis of the large and small arteries has occurred, the increased resistance rapidly leads to an alteration in the circulation. The maintainance of an equal supply of blood in the peripheral arterioles demands greater activities on the part of the heart, and whether the heart may properly compensate for this increased demand depends, in the individual case, upon the reserve activities of the musculature. An adequate nutrition, using the term in its broadest sense, will permit the myocardium to compensate by hypertrophy. It may be, as suggested by some, that prior to the arteriosclerosis, the heart may show no evidence of enlargement, but it would be going too far to say that in the absence of recognizable hypertrophic changes, the heart had not previously suffered myocardial lesions. It may be, as some have indicated (Hasenfeld, Romberg), that though the heart be damaged by degeneration, the hypertrophy does not arise until the musculature is given the stimulus for growth by suffering undue stretching.

Hirsch examined a series of cases with cardiac hypertrophy and found that where this hypertrophy was associated with arteriosclerosis, the left ventricle was mainly or alone involved. He also observed that when diseases of the lung and pleura had an effect

upon the pulmonary circulation, the hypertrophy of the heart was mainly on the right side. In a third group of cases those having chronic nephritis, a few showed hypertrophy of the left ventricle alone, but the majority showed that the hypertrophy involved both right and left heart, though the increase was greater upon the left side than the right. It was assumed by Stewart that this latter condition arose from an increased peripheral resistance in an increased viscosity of the blood acting primarily upon the arterioles and then upon the left ventricle. It is also indicated that the cardiac hypertrophy without valvular disease, associated with arteriosclerosis, while more especially affecting the left ventricle, is also present in the auricles (Hirsch). These authors claim that no pathological factor other than that mentioned is available for explanation. In his experimental work Stewart has been able to show that a hypertrophy may be induced by the production of aortic insufficiency and is the result of increased work.

The spirit has gone abroad that wherever arteriosclerosis is present in the body, there must be some increase in the blood pressure. Yet, when this is put to test, it is found that there is no uniform relation between them. Sawada found that in only about 12 per cent. of arteriosclerotics was there a heightened pressure. Romberg noted that in some districts arteriosclerosis was unaccompanied by increased pressure while in others it was the common manifestation. He points out, however, that in the latter chronic interstitial nephritis was a complication. Thus he indicated that arteriosclerosis with nephritis and arteriosclerosis without nephritis may occur in unequal proportion among different people.

There are so many factors which appear to influence the development of chronic disease of the heart, kidney, or arteries, that much speculation has been indulged in respecting the importance of each. Richard Bright, who was among the first to give definite recognition to these associated processes, looked upon the kidney disease as the prime causative factor for hypertrophy of heart. These contentions of Bright were opposed by Rayer, who denied the common association of heart and kidney diseases. Even Frerichs opposed Bright's view and claimed that cardiac hypertrophy preceded the nephritis. Up to this time much confusion existed in the classification of Bright's disease and difficulty was expressed in segregating the types, so that a proper comparison could not be made of the relationship of the diseased process to that in other organs. Traube, in 1845, divided Bright's disease into several groups, in one of which he found heart disease was particu-

larly prone to occur. He believed that some cardiac affections could lead to kidney disease, other than infarction, and eventually to chronic changes. Cardiac hypertrophy, he observed, occurred mainly with the contracted kidney and the left ventricle responded most promptly. This exposition by Traube was favourably received and indicated progress in the recognition of a variety of lesions in the kidney. Johnson, in 1852, noted the association of thickened arteries with chronic Bright's disease. The arterial change he viewed as hypertrophy of the media resulting from an impure blood containing urinary excreta. The minute arteries, it was thought, resisted the passage of this abnormal blood and the heart putting forth an increased effort developed a hypertrophy of the left ventricle.

In 1872 Gull and Sutton again attracted attention to the association of cardiac hypertrophy with chronic nephritis and arterial disease. They were, however, insistent that the cardiac condition was not secondary to the disease in the kidney, but resulted from a general arterio-capillary fibrosis. This vascular lesion they believed was not isolated to any part of the body, but was generalized, involving all the small arterioles. The vascular changes were present in the heart muscle as well as the kidney and other parenchymatous organs. It was claimed that this widespread arterial disease bore the same relationship to the interstitial myocarditis, as did the acute softening of the heart muscle to the embolic process of the coronary arteries as described by Virchow. These contentions of Gull and Sutton were substantiated by Buhl, Koester, Huber, Sternberg, and others. The cardiac disease was looked upon as resulting from an altered nutrition consequent to the coronary sclerosis. Previous to these observations much stress has been laid upon so-called idiopathic hypertrophy of the heart.

Gull and Sutton showed that the vascular lesions were independent of renal disease and that the kidney condition was a manifestation of a more general systemic process. Furthermore, they indicated that in other kidney diseases where much destruction of renal substance had taken place, with the probable retention of excreta, no cardiac hypertrophy was found. That cardiac hypertrophy was not the result of renal disease was illustrated in the fact that it might occur without the presence of kidney involvement, as well as preceding chronic Bright's disease. The authors observed a hyaline fibrous change about the vessels of the heart similar to that which they had found in the kidney. This they considered

was, in part at least, the cause of the hypertrophy. Gull and Sutton observed that the arteries in the pia mater in chronic interstitial nephritis sometimes showed a thickening of the intima, sometimes a hypertrophy of the media, but more commonly a fibrosis surrounding the vessel. The media sometimes was atrophied. These same changes were further found in the skin, stomach, spleen, lungs, heart, and kidneys. In a table of ages of patients examined, the authors have found that granular conditions of the kidney belong to a period of life at or over forty years of age. However, in the few cases in which the condition was found before the age of forty, the general disease process simulated those at more advanced ages. Here, too, there was observed the periarterial thickening accompanied by hypertrophy of the heart. They pointed out that clinically the manifestations of this general disease might be such that no attention is attracted to the heart, kidney, or arteries, but only after other progressive changes have damaged one of these systems may we recognize the presence of chronic Bright's disease with its accompanying manifestations. In the early stages the symptoms depending upon the intensity of the vascular involvement may be more evident in diverse parts of the body. In conclusion they recognized a systemic disease of the arterioles and capillaries which, as a periarterial fibrosis, may begin in the kidney, but which also has its pathological changes in other organs.

Our attention must not be too closely centred upon the conditions arising in any one organ. A general perspective of the lesions throughout the body is essential, and for this purpose nothing short of a combined study of many regions will allow us a proper interpretation of the diseased processes in question. It is furthermore necessary to study the disease in its various stages of development. Too much stress has been laid upon the importance of the pathological changes in the heart, kidney, or the arteries after one or other of them has suffered severely. To indicate that the heart and arteries are subject to a sclerosis in chronic interstitial nephritis is simply a statement of the gross pathological features observed in an individual after he has passed through consecutive stages of a disease and arrived at a point where the functional activities of several organs are so impaired that a continuance of healthy life is impossible.

Thus the observations upon the clinical pathology of these associated diseases are far from clearing up the moot points concerning the importance of common processes. Difficulty is experienced in indicating the beginning of a sequence of changes whose

manifestations are not the same, and whose recognition is only late in the progress of those changes. Some of the clinical features have been explained upon pathological findings. But here again much difficulty has been experienced in indicating the order in which the lesions have occurred. Conclusions have been drawn from studies made upon fully developed cases alone. In respect to these, the observers do not differ so much in the recognition of the lesions, but in the importance of each as dominating the presence and progress of others.

Senator points out that while there are a great number of factors which, upon purely theoretical grounds, may be suggested as the causative factor leading to cardiac hypertrophy, it is probable that no single cause may be found to account for all, as the individual conditions differ considerably in each case. Thus he believes that the increased viscosity of the blood, the narrowing of the capillary bed, the thickening of the muscular coat of the arterioles, the resistance of the blood stream displayed by the visceral arteries, as well as other factors, might be important causes for some cases, yet each will not act with equal intensity in the different individuals. He has further observed that the molecular concentration of the blood differs in the different forms of nephritis. The blood contains substances which are toxic for various tissue and the character and concentration of the albumens are altered. These changes have a direct effect on the heart muscle as well as an irritating action on the vessel walls, stimulating them to contraction.

He points out that chronic interstitial nephritis is a slowly progressive disease in which the changes do not occur suddenly. The altered blood content gradually acts upon the vessel walls, leading to histological changes as well as functional incapacity of their tissues. The circulatory change as well as the direct effect of the altered blood upon the heart is, he believes, the main cause for cardiac hypertrophy. He further suggests, however, that it is quite possible for the true causative factor to exist outside of the heart and kidney and to attack these organs simultaneously.

Although fibrous myocarditis was noted by Venivene (1529) and later discussed by Morgagni, its nature was not appreciated until 1806, when Corvisart recognized it as an inflammatory process and believed that it was always associated with a pericarditis or an endocarditis.

Pathologically the chronic fibrous myocarditis indicates a replacement of the muscular tissue of the heart by connective tissue. The left ventricle is mostly involved. Commonly when

small patches of fibroses are observed in the heart it is found that they had given no clinical evidence of their presence. It has, however, been demonstrated that the presence of connective tissue greatly interferes with the function of the heart by reducing its elasticity as well as its contractile power. Its association with cardiac hypertrophy has been commented upon, while Rigal and Juhel-Renoy have applied the term "*myocardite-scléreuse hypertrophique*," to this association. Leyden called attention to the several forms of cardiac sclerosis, sometimes observed in a diffuse and scattered manner while in other individuals isolated plaques are found. Koester drew attention to the frequency of the process and indicated the more important pathological characteristics of the disease. The fibrous areas appear as parallel tendinous streaks following the direction of the muscle cells. The distribution of these areas is not uniform. They are commonly present at the apex while the posterior and upper portion of the left ventricle may also show much involvement. They are prone to lie quite superficially either directly beneath the pericardium or close to the endocardium. The papillary muscles of the left ventricle are also structures showing a predilection for this process. Koester was able to observe that this development of connective tissue in the heart resulted from two different causes, on the one hand associated with inflammation with secondary destruction of the muscle fibres, or otherwise as a degenerative process without inflammatory change and associated with disturbance of the coronary arterioles. The former type is the one which is particularly associated with kidney and arterial disease. The distribution of the lesions in the heart muscle is quite characteristic, and may be observed in different stages of development. Inflammation precedes the development of the connective tissue in all. Koester believed that this myocarditis had its origin in infection, while Ruehle observed that it was most commonly associated with rheumatism. It was likewise pointed out by others that myocarditis as it occurs in rheumatism and its allied diseases was associated with endocarditis and pericarditis.

Aschoff and others have described an acute non-suppurative lesion of the myocardium occurring during an attack of acute rheumatic fever, acute articular rheumatism, muscular rheumatism, and rheumatoid affections. This heart lesion is quite distinctive and differs from that observed in infections by pyogenic organisms as well as by a variety of specific organisms. The lesions in the heart are focal and develop in the vicinity of the nutrient vessels

of the myocardium. Isolated areas of inflammatory exudate surround the small arterioles leading to greater or less degeneration of the musculature in the vicinity. The greatest amount of damage by these foci is produced in the outermost coat of these vessels and in the tissues immediately surrounding them. The small arterioles are in themselves not extensively involved during the acute stage. Gradually, however, as the process enters upon a chronic stage there is a thickening of the vessel wall, partly due to an hypertrophy, but mainly due to a fibrosis occurring in the adventitia with some thickening of the media. The total bulk of heart that is affected by this perivascular inflammation, is considerable, and the myocardial weakening observed in these affections is the result of the degeneration of the heart muscle occurring immediately about the nutrient vessels.

These observations by Aschoff and Tawara were confirmed in experimental studies by Waechter and others. It was shown that when organisms (streptococci) isolated from cases of acute rheumatic fever and the milder allied diseases, were inoculated into susceptible animals, tissue disturbances simulating the original disease in man could be readily induced. Not alone were the clinical manifestations reproduced but lesions occurred in the myocardium of a nature similar to those noted in the human heart. The lesions have been found so characteristic that from the myocardial picture alone the diagnosis of a rheumatic affection could be made. In a series of experiments to which we will refer again we have been able to confirm the findings of Waechter.

In an individual study reported upon during the past year we have made observations upon the various arteries of the body during acute rheumatic fever. It was observed that the larger vessels, and more particularly the arch of the aorta, which are supplied by nutrient vessels advancing into the outer and middle coat, suffered a non-suppurative inflammatory reaction similar to that found in the heart. This reaction was of the same character as that in the myocardium and was disposed in a perivascular manner. The vasa vasorum of the arteries take the place of the small divisions of the coronary arteries of the heart. These vasa vasorum carry the burden of the reaction in the vessel wall. Accompanying the reaction there is a certain destruction of the essential elements of the arterial coat, leaving the vessel weaker and subject to subsequent fibrous replacement of its own tissue. In our earlier studies it appeared to us that the peripheral arteries did not become involved. This conclusion was mainly drawn from a study of arteries

of intermediate size which passed to the limbs and to the main viscera. It is true that in the majority of cases these moderate sized arteries of the muscular type show no evidence of inflammatory invasion. Nevertheless, as we then indicated, an irregular distribution of the inflammatory reaction may be observed in some of the arterioles when the larger visceral arteries are not involved.

In the cases which we have examined, the simultaneous occurrence of lesions in the myocardium and the arteries has been very constant. The intensity of the reaction in each or both has been varied; at times that in the heart being greater and out of proportion to that in the arteries, at other times again, the reverse was observed. Moreover, we have been able to follow the processes during the various stages of development. From the acute non-suppurative variety with extensive perivascular infiltration of the small arterioles all gradations of chronicity with progressive fibrosis have been found. The amount of fibrosis occurring in the vicinity of the arterioles was dependent upon the intensity of the reaction, and the extent to which the neighboring parenchymatous tissue was affected. From the minute, microscopic fibrous tissue masses to the larger fibrous streaks, such as are observed in the heart and large vessels, all degrees and stages were demonstrated.

It is in association with these particular arterial lesions that hypertrophy of the heart is prone to develop. This hypertrophy, however, does not begin to show itself until the reparative processes about the minute vascular channels become evident. In many cases the heart suffers some dilatation of its cavities during the acute stages, but though the heart at this time is receiving the stimulus for growth through stretching, it is unable to compensate so early by hypertrophy on account of the systemic illness, which offers the explanation in an inadequate nutrition. Hypertrophy does not begin until recovery from the effects of the immediate acute involvement has passed over. Repair of the inflammatory focus does not begin until, in part, at least, the infection is overcome. From this time on not alone is there a repair of the lesion induced during the inflammatory reaction, but also opportunity is given for the compensation of the weakened myocardium sustained in muscular degeneration.

When, now, we suggest a type of kidney lesion ending in chronic interstitial nephritis as commonly associated with this combination of acute and subacute myocarditis and arteritis, we will receive considerable opposition from clinical observers. The constancy of association of myocarditis and mesarterial diseases has

gradually impressed itself upon us so that we view this occurrence as the usual lesion in certain forms of infection. We have hardly reached the time when all are willing to place definite forms of kidney disease in the same group. Nevertheless, an examination of human material as well as experimental studies force us to accept this view. As is true with so many forms of non-suppurative infections in which a bacteraemia is temporarily and periodically present, many of the organs suffer unequally. The bacterial attack upon various tissues is only an incident in the disease, and it would be impossible to designate the lesion in each organ as a common or constant manifestation.

With the type of infection which dominates acute and subacute cardiac disease, we recognize organisms which are not constant in their virulence, which are sporadic in their systemic distribution and which are very uncertain in their localization in the tissues of the body. At times, during a given illness a dissemination of bacteria occurs in the blood stream for short periods of time, then the circulation is rapidly freed from the meteor-like distribution, only to be involved in a subsequent and similar reinfection from a local focus. The disease does not carry with it a constant bacteraemia.

As, then, the hæmatogenic infection of different organs is so uncertain and unequal, the lesions arising in different cases are difficult of comparison. We have, however, found that inflammatory changes arising in the interstitial tissue of the kidney were not so uncommon in these infections. In the milder forms where the kidney was least involved and where clinical evidence of a nephritis was wanting, the lesion consisted of a lymphocytic and plasma cell infiltration in the interstitial tissue close to the interlobular arterioles. This subacute inflammatory reaction was distributed mainly about the arterioles and began in about the middle of the medulla. The inner coats of these arteries were not appreciably altered but the adventitia was quite loose and cedematous with an infiltration of lymphocytes. From the perivascular lesion the inflammatory exudate spread along the course of the vessel into the cortex, so that streaks of infiltration could be followed from the medulla to the surface of the organ. Primarily, this perivascular non-suppurative inflammation with its cedema gave a more bulky appearance to the involved areas. The tubules of the vicinity were surrounded by the exudate of cells while but little change occurred in the epithelial lining. Similarly, the capsules of the neighbouring glomeruli were not uncommonly surrounded by a similar infiltration.

For the most part the inflammatory reaction was present in radiating zones, leaving intervening patches of kidney tissue uninvolved. The larger vessels near the base of the pyramids also showed a perivascular reaction, but the main artery to the kidney was, in itself, devoid of inflammatory change.

This non-suppurative inflammatory reaction beginning in the vicinity of the interlobular vessels and extending through the cortex appears to be a typical lesion associated with the common subacute inflammation of the myocardium. In the human organs, however, it is usually associated with other lesions which tend to obliterate the character here described. Individuals dying during the first attack of acute infective myocardial disease have commonly extensive endocardial vegetations. The presence of embolic masses of small or large size is apt to involve the kidney in a well marked infarct or lead to the occlusion of the vessels to the glomeruli with subsequent changes in these structures, not definitely to be viewed as the typical lesion of the disease.

We must, however, recognize a form of acute glomerulonephritis with the local exudate, and occasionally showing a proliferative reaction within the glomerulus or its capsule, as a common reaction of the kidney. The presence of an acute glomerulonephritis in a number of bacterial diseases is now well recognized, particularly through the work of Councilman and Loehlein.

The observations upon the various types of acute non-suppurative nephritis, indicate the close relation of the lesion to the circulatory apparatus. That at times the lesion is greater in the glomerulus while at others the perivascular reaction appears more intense, is not to be wondered at, when we remember the unequal reaction in tissues by many varieties of bacteria. Moreover, the different forms of reaction occurring within the glomeruli may well be variations in the intensity of reaction to a single strain of organism. Thus, as has been amply illustrated in late years, a single irritating agent such as uranium nitrate may give rise to tubular, glomerular, and even vascular lesions in the kidney. We have repeatedly observed a variety of pathological processes in different glomeruli brought about by the same bacterial agent.

These inflammatory disturbances of the kidney, showing their main reaction about the blood vessels and their associated parts, were observed in the early stages of heart and arterial disease. When closely analyzed it will be observed that the reaction in each of these tissues, heart, kidney, and arteries is very similar. There is a type of subacute inflammation particularly distributed in the

vicinity of the small nutrient vessels, disturbing the parenchymatous tissue in the immediate vicinity. We have indicated the late effect of this inflammation upon the heart muscle as well as the disturbance of the media of the arteries. We now call attention to the effect of the inflammatory reaction upon kidney tissue.

In the milder conditions the reaction remains localized in the vicinity of the vessels, causing but little disturbance of the tubules or glomeruli. An œdema pervades the intertubular connective tissue in the interlobular zone. Relatively little kidney tissue is involved by this localized inflammation, although streaks of reaction follow many of the small cortical arterioles. Where the reaction is more intense the infiltration spreads for some distance into the cortex involving considerable areas in an irritative process. More or less tubular degeneration may be present and granular debris appears within the secreting structures. The glomeruli may be involved in congestion with proliferation or show the presence of a lymphocytic infiltration amidst the capillary loops. Some of the glomeruli may become occluded and undergo hyaline change. Crescentic spaces between the glomerulus and its capsule show the presence of debris and hyaline masses. Occasionally hyaline and granular casts are found within the tubules.

As these inflammatory lesions progress to the chronic stages, the perivascular areas of infiltration become replaced by connective tissue. There appears to be a large gap in the observations, both clinical and pathological, between the acute and chronic stages of the disease. Many individuals die during the height of the disease when the acute reaction is well evident in the kidney. Otherwise death does not overtake them, save through intercurrent accident, until the late sequelæ bring about these changes in the heart, kidneys, or arteries, which have been so thoroughly observed and studied. The intermediate stages of repair are infrequently seen. Nevertheless, one may observe combinations of the acute and chronic lesions in those cases where the disease has been of a recurrent nature. This is not so uncommon, and we have observed a number of instances where perivascular fibrosis was accompanied by an acute lymphocytic infiltration. The acute lesions of the heart were a further evidence that the inflammatory infiltration was a recurrent one and not that of a progressive disease.

The healing of the acute inflammatory exudate takes place by a fibrosis which is observed in radiating streaks advancing from the base of the pyramids through the cortex. The small arterioles which ramify from the interlobular vessels carry with them an

excess of connective tissue. This fibrosis develops through the increase of connective tissue around the small vessels and becomes attached to the fibrous capsule of the organ. The radiating character of this fibrosis is quite distinct. Only secondarily does it involve the tubules and glomeruli which lie in its path in the cortex. The structures intervening between these lines of fibrosis are uninvolved in the cirrhotic change so that many glomeruli throughout the cortex have normal characters and the tubules lying outside of the zone of fibrosis are unchanged. With the shrinkage which accompanies all forms of inflammatory fibrosis, the involved areas tend to narrow the cortex by drawing the surface closer to the outer border of the medulla. The unequal distribution of the fibrous tissue leads to an irregular amount of contraction producing a very granular kidney. Naturally the amount of shrinkage is dependent upon the state of the disease as well as the intensity of the primary inflammatory process. This final stage is known to us as the granular kidney, the genuine contracted kidney, or true chronic interstitial nephritis.

In our discussion we have suggested a bacterial irritant underlying the inflammatory reactions in each of the involved organs. The same organism appears capable of producing inflammatory lesions simultaneously in many tissues and owes its distribution to the blood stream.

In recent years much has been done to indicate the importance of definite streptococcal infections in the inflammatory lesions of the heart and circulatory organs. Although all are not agreed upon the particular type of organism which is mainly at fault, yet it is important that various observers have had their attention attracted to an organism or group of organisms which induce a sub-infection, having more severe focal processes in one or other organ. Though we believe that these focal depositions of bacterial infection may involve many different organs and bring about various grades of inflammatory reaction, our chief attention has centred about the infective heart disease. Nevertheless, the arteries, meninges, kidneys, joints, and liver have been shown to be variously involved in different cases. A study of the organisms associated with such lesions has called forth a nomenclature greatly confusing the subject.

The important bacteria belong to the group of streptococci, and may be recognized by their biological characters and separated from the pus-producing streptococcus, as well as from the pneumococcus. By Schottmuller this variety of streptococcus was

named the streptococcus viridans. In the further investigations it was shown that streptococcus viridans represented a group of organisms which, although having some common characteristics separating them from other members of the streptococcus group, had further points of differentiation which divided the group into a number of types, whose characteristics were fixed and whose habitat was more or less defined. To this group belong the streptococcus fecalis, streptococcus salivarius, streptococcus equinus, streptococcus mitis, and several unnamed forms. The group in itself is quite distinct and by proper means can be readily recognized.

The organisms which have been isolated by different observers from acute and subacute endocarditis belong to the streptococcus viridans group as described by Schottmuller. Such organisms as were described by Poynton and Paine as the streptococcus rheumaticus, the endocarditis coccus of Libman, and the organisms described by Rosenow must be considered as members of this group. It has been pointed out by Gordon and others, including my colleague, Dr. Holman, that the organisms found in connexion with heart lesions do not represent an individual type or a specific variety, but recognizing that they belong to the streptococcus viridans group, they may be represented in a variety of types. Of five organisms obtained from different cases of heart disease, three were shown by Gordon to simulate the streptococcus mitis, while two had characters similar to streptococcus salivarius. Dr. Holman has likewise demonstrated the type of streptococcus salivarius in the blood of patients with vegetative endocarditis, while in three other instances he isolated a form simulating the streptococcus fecalis and in another the streptococcus equinus. Andrewes and Horder in an extensive study upon streptococci found the presence of the streptococcus viridans in fifteen out of twenty-three cases of malignant endocarditis. Of these, eleven belong to the group of streptococcus salivarius; and four to streptococcus fecalis.

In five of our cases having acute non-suppurative processes in the heart, arteries, and kidneys, there was isolated a type of the streptococcus viridans from the blood at autopsy.

The association of these organisms with the occurrence of inflammatory processes in each of the three organs under discussion, led us to test our results upon animals. Through the kindness of Dr. Holman, I had the opportunity of obtaining a number of types of the streptococcus viridans for the tests. Rabbits were used, and living cultures in different amounts were inoculated intravenously. Nine cultures giving the reaction of the streptococcus fecalis,

seven streptococcus mitis, four streptococcus salivarius, one streptococcus equinus, and four other unnamed types of the streptococcus viridans were used. None of these inoculations gave rise to pus formation (one recently isolated strain of streptococcus salivarius was found to be highly virulent for rabbits, death being produced in forty-eight to seventy-two hours). The inoculated animals were killed at different intervals, and the lesions were studied both macroscopically and microscopically. In the majority of instances only one inoculation was given.

In brief, we were able to demonstrate pathological processes in the majority of animals surviving beyond the fourth day. The variation in the pathogenicity was quite evident even among the organisms of the same strain. Some of the older cultures proved to be of low pathogenicity so that, although a slight non-suppurative reaction appeared at the end of the first week, complete resolution occurred within a month. On the other hand, the more virulent forms showed quite intense reactions by the end of the first week which persisted for varying periods of time up to six weeks. When, however, the inoculations were repeated at intervals of three weeks, a progressive inflammation with productive fibrosis was observed over a period of seven months.

In our experiments we were unable to indicate definitely the type of organism which appeared to give the greatest tissue reaction. The variation in the length of time in which the different organisms had been cultivated on artificial media had greatly altered their pathogenic qualities.

The particular point, however, in which we were interested was the simultaneous occurrence of lesions in the heart, arteries, and kidney. The affection of the heart was mainly to be observed in the myocarditis which simulated that described for the human heart. An interstitial infiltration of lymphocytes and plasma cells was the usual observation, and this infiltration was mainly in the vicinity of the small arteries. We failed to demonstrate the uniform periarteritis and mesarteritis of the ascending aorta, as we have on a previous occasion indicated for the human vessel. In two instances a slight grade of periaortitis was present. Otherwise, however, we found an irregular and inconstant periarteritis of the arteries of the liver, diaphragm, mesentery, and kidney. In the latter organ upon which our attention was concentrated, some remarkable results were obtained.

The kidney lesions were common and occurred in greater frequency and intensity than in the heart. They were associated

with the vascular system of the organ. The larger vessels were the least involved, but the interlobular vessels and the afferent vessels of the glomeruli showed an inflammatory attack of a considerable degree. The nature of distribution of these vessels led to a radiating character of the inflammatory process, extending from the intermediate zone to the capsule. The picture was identical with that described in the spontaneous lesions in man. Moreover, all gradations from the acute process to the chronic fibrosis could be followed. A mild grade of granular kidney was produced. In three instances in which the disease had lasted over four months there appeared slight hypertrophy of the heart.

For the present I need not go into the further details of these experiments, save to indicate that the lesions produced experimentally closely resembled those which we meet with clinically. The important finding of the correlation of the heart and kidney in the inflammatory reactions, is worthy of comment to indicate how a general bacterial process may underly a pathological condition arising in each, and before either of these organs has an effect upon the other through its functional incapacity. The cardiac degeneration occurs during the early and acute stages of the disease. The repair with its accompanying fibrosis is prone to have hypertrophy develop with it. So too, the kidney lesion is individual, developing from a bacterial irritant inducing fibrosis about its blood vessels. A vicious circle may, no doubt, develop in the course of the disease which may react on other vital organs. The peculiarity of the infection in being distributed by the small arterioles and having its main action upon the tissue in the vicinity of these, is worthy of our notice. This finding is but a substantiation of the observations of Gull and Sutton. It appears, therefore, that the heart and kidneys bear to each other a relation during this infection only in proportion to the nature and distribution of the inflammation about their vascular system.

I would not have you believe that the arterial affection as an arteriosclerosis is the predominant one, but the organic changes are dependent upon the distribution and the extent of the perivascular inflammatory attack. Moreover, I further wish to indicate that the interdependence of the lesions of the heart and kidneys is through their circulatory system, but not because of an arteriosclerosis as we ordinarily understand it.

Thus our "triple alliance" is complete. Each of the three organs has its individual duty to perform, which has an important bearing upon the health of the other. Common enemies (bacteria)

attack them simultaneously, leaving one, or another, or all, badly abused. Repair of the injuries results in fibrosis which may manifest itself in the "senile syndrome."

The hypertrophy of the heart has its beginning in a process of repair of the heart muscle damaged by bacterial invasion. Subsequent factors, such as increase of the blood pressure and the effect of retained excretory products, probably assist in increasing the cardiac hypertrophy in the later stages of the disease.

The typical arterial lesions under discussion are not what is ordinarily classified as an arteriosclerosis, but consist mainly in a periarterial reaction. Just what relation there may be between the periarterial inflammation of this type and modular intimal arteriosclerosis, we are at present unable to say. However, this is evident from our observations, that the periarterial inflammation following the vasa vasorum precedes the reaction in the intima. The late manifestations of the arterial involvement are observed in a perivascular fibrosis.

The kidney lesions are of the nature of a true non-suppurative interstitial inflammation which begins in the perivascular tissues. The inflammatory reaction follows the distribution of the arterial supply, involving also the glomeruli to a greater or less degree. The chronic stage follows with repair by fibrous tissue, and subsequent contraction of the organ leads to the small granular kidney. Tubular changes are not great and are secondary.

CONCERNING THE IMMUNITIES OF TOLERANCE**A PRELIMINARY COMMUNICATION****BY JOHN L. TODD AND J. G. ADAMI**

THE purpose of this paper is to express a hypothesis concerning certain forms of immunity, to invite criticisms of it from you, and to review the facts, for the most part of common knowledge, upon which the hypothesis is based.

Natives of the tropics, and Europeans who have "become acclimatized" by long residence in the tropics, are often broadly said to be immune to certain tropical diseases, such as yellow fever and malaria. But a very short residence in the tropics is enough to make it obvious to any physician that natives and acclimatized Europeans may suffer from the diseases to which they were said to be immune. As a rule, however, the disease in them is much less serious than it would be in a new-comer. Symptoms, both objective and subjective, may be entirely uncharacteristic and, indeed, imperceptible in them although parasites capable of producing severe—often fatal—infections when introduced into more susceptible animals or persons, can be found in their blood. Their immunity in such cases is, then, in the nature of a tolerance, and it is not a complete or sterilizing immunity by which the parasite is destroyed. The diseases in which such a tolerance is most striking are those which are transmitted by insects or by other invertebrate hosts. In the tropics insect transmitters of disease are never absent, neither are the sources at which they may become infected with disease. Consequently, it is obvious that those living in the tropics, under ordinary conditions, must be constantly exposed to infection by disease transmitted through the agency of biting insects. In short, residents in the tropics may be free from the symptoms usually caused by infection with certain viruses, although they harbour those viruses; and the method by which the viruses are transmitted makes it certain that every individual is normally inoculated with them many times in a year. Nay, more, if such apparently immune individuals leave the tropics and live for several years in countries where tropical diseases do not exist, they will, on

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their return to the tropics, suffer severely from disease produced by the parasites of which they were once tolerant.

Two explanations of this state of affairs suggest themselves. The first is that a non-fatal infection, contracted early in life, persists in the individual who remains more or less completely tolerant to it (the extent to which such an infection provides protection against intervening infections by other, perhaps more virulent, strains of the same parasite is a subject for enquiry, as are the causes which induce change in the virulence of a virus); the second is that a comparative tolerance of the parasites, acquired by a first infection, is maintained by frequent reinfections. Therefore, it seems probable that at least some of the "immunity" which may be acquired against the viruses of certain tropical diseases may result, either from a persistent infection or from constant reinfection by the virus concerned.

All that has been said is as true of native and alien animals, and of some of the diseases to which they are subject in the tropics, as it is of men.

Many of the diseases in which the phenomena mentioned were first noticed, and are especially obvious, are ordinarily confined to tropical and subtropical climates. They are caused by protozoan parasites or by viruses of unknown nature. It has been suggested that some, at least, of these unknown, often ultramicroscopic, viruses should also be classified with the protozoa; but the reasons given in support of this suggestion are insufficient. From a clinical standpoint, there is much similarity between the types of immunity that may exist against viruses of varying systematic position. Therefore, immunity against parasites of most diverse position, including bacteria, might be considered here if there were time to do so; they will be considered fully in the extended form of this paper.

Some of the facts, for the most part well-known ones, on which the preceding statements are based, are contained in the following paragraphs. Malaria is considered first and in greatest detail because more is known about it than about most of the diseases with which this paper deals.

Malaria is caused by a protozoon which is transmitted from healthy to infected persons by the bites of a mosquito. In tropical countries, when malaria is endemic and mosquitoes have many opportunities of feeding on infected persons, a considerable percentage of the mosquitoes capable of transmitting malaria are infective. As a result, every native child and every new-comer, who

does not employ modern methods of protecting himself, inevitably contracts malaria. Actual examinations of native children in many parts of the world show that malarial parasites can often be found in every child under ten examined; nevertheless those children may be comparatively healthy and are drawn from a population that maintains itself successfully in its environment. The usual well-being of natives and of the few Europeans who become acclimatized is proof that an immunity may be acquired against parasites which are able to produce acute, even fatal, attacks of malaria in native children and in newly-arrived Europeans. An exceedingly careful search will often reveal the presence of small numbers of parasites in the blood of apparently immune persons. Consequently, the "immunity" which they possess can not be explained by the usual hypothesis, employed in connexion with bacteria, that the causative agent is lying latent, either enclosed in a fibrous capsule, or in some of the sacs of the body—the gall-bladder, for example. But that this immunity is not necessarily a complete immunity, is proved by the occasional occurrence of more or less atypical attacks of malarial fever in such persons. During these attacks malarial parasites are numerous in their blood. It is well-known that persons who have apparently recovered from malaria and who have been resident continuously in countries where malaria does not exist may suffer from a return of the disease after the lapse of a period of so long as two or three years of apparent health. In such cases there has been an infection which persisted unaccompanied by obvious symptoms. The onset of acute symptoms and of the multiplication of parasites may be occasioned by an increased virulence of the parasites, by lessened resistance of the host, or by both of these factors. That lessened resistance on the part of the host may induce exacerbations of the disease, is certain. That strains of parasites—variants or mutants—possessing unusual virulence may be produced from causes dependent upon the parasites alone, seems probable.

These facts make it certain that an immunity, of a certain order, can be acquired against malaria. That the immunity is not a racial nor a permanent one is indicated by the susceptibility to malaria of natives of tropical countries who return to their homes after prolonged residence in places where malaria is not endemic. In short, persons once infected with malarial parasites may remain infected for many years, and those living in tropical climates are constantly exposed to reinfection.

It follows from these facts that those who seem to be immune

to malaria are often really only tolerant of an undeclared infection; concerning the mechanism whereby this tolerance is produced nothing is said. It is suggested that this tolerance is maintained by constant infection which is either persistent or kept up by repeated reinfection. There is, as it were, a constant "vaccination" by the malarial parasite.

Shortness of time makes it impossible to consider other diseases in such detail; but a little reflection will convince that many of them, especially those caused by protozoa and transmitted by the bites of arthropoda, have many points in common with malaria.

The tolerance of infection which may be acquired for many pathogenic babesias and trypanosomes is notorious. Natives of regions where yellow fever is endemic are said to be "immune to yellow fever." It is recognized, however, that the attacks in some cases of yellow fever may be so slight that its nature is not clinically recognizable. Nevertheless, such a case is capable of being the source of infection from which serious, typical cases originate. It is usually accepted that the immunity of natives to yellow fever, is the result of such clinically ill-defined attacks. The persistency of protozoan infections has been emphasized by the discovery of treponemata in the tissues of those suffering from quaternary syphilis. From syphilis also comes support for the idea that persistent infection maintains immunity, since it has been repeatedly shown that syphilitic patients, presumably sterilized of their parasites by salvarsan, may contract a second primary sore when it would be impossible for an untreated, still-infected patient to do so.

The existence of many recognized similarities between the courses of these diseases and of others, concerning which less is known, suggests that the mechanism of the immunity may be similar in all. It is consequently proposed that, for example, the immunity enjoyed by most inhabitants of temperate climates to the exanthemata is due to a constant infection of them by the parasites of the diseases concerned. From what has been said above as well as from our knowledge of what actually occurs in typhoid, tuberculosis, leprosy, and amœbiasis, for example, there should be no difficulty in accepting the concept of apparently healthy, possibly adult, carriers of virulent viruses of the many diseases usually confined, in their declared forms, to childhood in this country, just as declared malaria is usually confined to children in the tropics. Such a concept would explain the origin of sporadic cases for which no certain source of infection can be designated. Many persons in our environment reach adult life without having suffered from

clinically recognizable forms of many of childhood's diseases. But everyone has had days of malaise or of "indefinite febricula;" these ill-defined illnesses may easily be the expressions of attacks which establish an immunity against certain diseases of our surroundings, just as immunity to yellow fever is acquired by children in districts where that disease is endemic. It is conceivable that, in some instances, the appearance in adults of diseases to which immunity is usually acquired in childhood may be due to the cessation of a protecting infection; just as a second syphilitic infection may be contracted after a sterilizing treatment by salvarsan.

At present, it seems fruitless to conjecture concerning the causes which may lead to increase or diminution in the virulence of parasites, and consequently to alterations in the seriousness and incidence of the diseases caused by them. It is very suggestive in this connexion to remember that the reactions of parasites to drugs may alter; to remember that the assimilative processes of a protozoon may be altered so that a once fatal drug becomes harmless and that morphological as well as physiological changes may be produced in a trypanosome by introducing changes—drugs—in its environment.

Conclusions. The conclusions to which this reasoning leads and on which your discussion is invited are:

1. The apparent immunity which can be acquired against the parasites causing many diseases, is often the result of a tolerance of those parasites, acquired by their host.

2. The tolerance is maintained by a constant infection by the parasite and it disappears when the infection maintaining it ends.

3. A constant infection upon which tolerance depends may conceivably result (a) from a long-continued single infection or (b) from many repeated infections. It is possible that tolerances may be produced in both or either ways.

THERE has been much delay in the construction of the King George Hospital for infectious diseases at Winnipeg, but at last it is practically completed. The cost has been greater than was estimated; the intention was to spend not more than \$200,000, but over \$300,000 has been spent.

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SYMPTOMS AND TREATMENT OF HYPERTHYROIDISM

BY DR. C. C. TATHAM

Surgeon, Central Prison Farm, Guelph, Ontario.

AS there seems to be more or less difference of opinion as to what constitutes pathological hyperthyroidism as distinguished from or taken in conjunction with the disease called by the various names of Graves' disease, Basedow's, or the more common name of exophthalmic goitre, it will not be out of place to discuss this phase of the subject briefly. While one of the cardinal symptoms of exophthalmic goitre is exophthalmos, this, although a very important symptom of hyperthyroidism when it occurs, is not a constant symptom, and statistics go to show that it occurs only in about sixty to eighty per cent. of the cases; indeed one frequently sees a very severe case of hyperthyroidism with little or no exophthalmos, and it is a matter of regret that the disease is sometimes unrecognized because of the lack of this symptom.

Again, the terms exophthalmic goitre, Graves' disease, or Basedow's disease, are associated in the minds of many with a very distinct enlargement of the thyroid gland. It is not necessary for a patient to have a distinct external protrusion of the thyroid in order to have the symptom of hyperthyroidism markedly developed. While there is no definite rule as to the amount of the enlargement, the middle and one lateral lobe (very often the right) are distinctly enlarged with the other lateral lobe but slightly; also there may be a marked difference in the size of the thyroid gland from week to week.

It is important to distinguish true hyperthyroidism from relative or compensatory hyperthyroidism, which is only temporary, and may be physiological, such as occurs in menstruation, pregnancy, puberty, and the acute infections, etc.; also from those cases which belong entirely to the sympathetic nervous system, and in which the enlargement is compensatory and the symptoms not constant. These cases are characterized by goitre and extreme nervous irritability without noticeably constant hyperthyroidism. Under exertion or excitement the thyroid enlarges from evident congestion, and is doing normal work, but the chromaffin group of glands are at

fault, consequently the thyroid appears to be acting morbidly. Dr John Rogers¹ says that "in these cases the primary disturbances should be regarded as a fatigue of the thyroid, which is really secondary to the nervous irritability, and is due to some error in nutrition in the nervous or chromaffin system." These cases are often very puzzling, and must be distinguished from *hypo*-thyroidism.

The over-active thyroid has been recognized, and more or less investigated for the last one hundred and twenty-five years by such men as Morgagni, Parry and Flagani; then Graves in 1835, Basedow in 1858; later by Hirsch and Moebius, and more recently by Kocher, Klose, Plummer, Garre, the Mayos, Rogers, and Beebe, etc. With the earlier investigators the symptomatology varied between the heart, the nervous system and intestinal toxins, and it was not until twenty-seven years ago that Moebius first presented his theories of hyperthyroidism. Since this time investigators have made rapid progress. But, while rapid progress has been made, still there are various points to be cleared up in the pathology of the disease. Such, for instance, as the relation of the thymus gland to hyperthyroidism. Garre² believes that there is a class of patients suffering from this disease which must be separated from the remainder, owing to the combination of a persistent thymus with the usual goitre, and which is recognizable by the exceptional severity of their symptoms.

Coming now to the symptoms proper, we find that tachycardia is probably the most constant of all, and the pulse rate may be anywhere from eighty to one hundred, up to one hundred and sixty or over, depending upon the severity of the disease. The blood pressure is usually raised, and in some cases markedly so. A bruit is usually heard over one or the other of the poles of the gland, usually the lower. The enlargement may be slight, as in the soft vascular pulsating forms, or it may be extensive as in the adenomatous form with hyperplasia.

In outlining the gland it is always best to put the patient's neck on the stretch, and have the patient swallow while palpating, as well as turn the head from side to side, as much of the gland may be hidden beneath the sterno-mastoid, or the clavicles. Ochsner³ says that "a positive diagnosis can always be made if in the presence of tachycardia there is even the slightest degree of exophthalmos, or enlargement of the thyroid gland." Of the many other important symptoms there are present, muscular tremor (apparent when patient is asked to extend hand or arm), muscular weakness, always found in advanced cases, and sometimes quite

early; nervous excitability, which may take various forms, in the early stages the patient often being very moody, sometimes joyous, but very often depressed. In the latter stages, the patient's nervous condition is one very often bordering on insanity. The nervous system is especially prone to attack by this disease, and in some cases quite a marked mental deficiency develops.

Vertigo is occasionally present. Dyspnoea may be present and may be either paroxysmal in character from pressure on the trachea, or from oedema of the lungs in the later stages. We may have intermittent vomiting, diarrhoea, etc., the abdominal symptoms in some cases predominating.

In the case of a patient aged thirty-five, the abdomen remained markedly distended, was very tender on pressure, and the menses after being irregular for six months, ceased altogether for a period of six months. In this case the temperature ranged between 97° and $100\frac{1}{2}^{\circ}$. The diagnosis had been previously made of "walking typhoid," and later of appendicitis. The menses did not become regular, or the symptoms clear up until after partial thyroidectomy. The patient complained of great thirst and dryness of the mouth, and had a heavily coated tongue. She had no glycosuria. There was a markedly brownish discolouration of the body with deeper pigmentation about the nipples and orifices. The menstrual function is nearly always interfered with in advanced cases. Another patient had irregular menses with dysmenorrhoea, with fits of almost maniacal excitement at the menstrual period. The flow was scant. This altogether cleared up after operation.

Psychic excitation, physical and mental fatigue, tend to increase the gravity of the symptoms. In advanced cases we see great emaciation together with anæmia, and frequently oedema of the eyelids, and later of the feet.

The administration of thyroid extract, or iodine, has a very harmful effect on these patients.

The eye symptoms vary, and while important, there is no one symptom that is constant. The most important when it occurs, is of course, exophthalmos. Various explanations are offered for this symptom, such as a weakness of the muscles supplying the eye—a result of the thyrotoxicosis. Some suggest that a venous enlargement helps to push the eye-ball forward. We know, of course, that in marked cases there is an increase of retrobulbar fat.

Very frequently, even in relatively mild cases, we have: (1) Graefe's sign (1864), in which, in directing the eye downward, the lower margin of the upper eyelid does not follow the line of vision

normally, but lags behind or follows in an irregular or spastic manner. (2) Stellwag's sign (1869), in which there is a retraction of the upper eyelid, and at the same time the lid remains much more stationary than it does under normal conditions, and there is also a marked decrease in the frequency of winking. (3) Moebius' sign (1895), in which there is an insufficiency of convergence. It can be elicited by directing the patient to look at the ceiling and then suddenly at her own nose, when it will be found that only one eye will be directed toward the nose, and the other may take any other direction, although it usually maintains its axis fairly parallel with the eye that is directed toward the nose. (4) Dalrymple's sign, a widening of the palpebral fissure, showing more sclera.

The blood picture is of great interest. Kocher, of Berne, states that leucopenia exists in this class of patients with a relative increase in the mononuclear cells, and further that the processes of assimilation are markedly diminished. In early cases and those that have improved on early treatment, there is usually no increase of lymphocytes. The polymorphonuclear leucocytes are diminished while the total number of leucocytes is usually normal or slightly below.

In considering the treatment of these cases there are many factors to be taken into consideration, for while we know that a patient seldom dies from hyperthyroidism, we also know that patients very frequently die from the effects produced on the vital organs, such as the heart, kidneys, liver, etc., by the continued action of the poison. This action is usually extended over a lengthy period, but as C. H. Mayo⁵ well says, "there are numerous instances where cases of hyperthyroidism have run a rapid course to death, which were essentially due to toxæmia." We must also be cognizant of the fact that there may be many remissions and exacerbations of the disease. MacCarty, from a study of this question, has advanced the "revision theory" that "there is a tendency in the gland of hyperthyroidism to revert toward the simple form of goitre at some period of the disease in practically all cases which are not progressive, and also that such reversions may occur at any period or stage of the disease."

Most of the severe cases of hyperthyroidism give a history in which recurring spells of exacerbation of symptoms are well marked. Further, we often find an enlargement of the liver and spleen in advanced cases. It is now the general consensus of opinion among men of large experience with this disease, that the treatment for true hyperthyroidism is surgical. By this I do not mean to say

that in cases far advanced; in which the musculature of the heart is damaged beyond repair, or the other essential organs irreparably damaged, that surgery will cure. We can remove the cause, but we cannot remove disastrous effects already produced. I would therefore advocate early recognition with partial thyroidectomy. If the patient refuses operation, or is in a too far advanced stage, we may have recourse to Rogers' and Beebe's, or Moebius' serum, with absolute rest both physically and mentally, and the exhibition of proper, suitable, internal, dietetic, and hygienic treatment, with later, if possible, ligation of one or more poles of the gland.

In this connexion I may mention that I have not seen any marked results from Forscheimer's quinine hydrobromide treatment in cases of true hyperthyroidism.

Before proceeding to operation it is advisable, as far as may be possible, and for the best results, to have these patients brought to the ideal surgical state, the state designated by Dr. Geo. W. Crile,⁷ of Cleveland, as "anoci-association." We must endeavour to banish all fear from the minds of our patients, and we may frequently accomplish this by giving our patient bright, cheerful surroundings, with a tactful nurse, and in some cases by daily use of the anæsthetic mask, suggesting to the patient that this is a part of the treatment, and by keeping knowledge of the operation from the patient, finally anæsthetizing the patient in her bed preparatory to the operation. It is most important for the best results, to recognize all the "factors of safety" in the treatment of this disease, and we should use small preliminary doses of morphine and scopolamine, better in some cases morphine and atropine. We may further protect the brain by, if necessary, using Crile's "anoci-preparation," *i.e.*, the local or intra-neural infiltration of novocaine. Crile also claims that "nitrous oxide" is much safer than ether.

If in an advanced stage we find it necessary, or advisable, to ligate one or more poles of the gland, either as a preliminary step or as a final remedial measure, it may be done under local or general anæsthesia, and in doing this it is better to include in the ligature a small part of the gland. This operation should not be undertaken without due consideration, however, for while there is less shock produced than in a partial thyroidectomy, in unsuitable cases it is a severe operation. Partial thyroidectomy is the operation of choice in suitable cases, but here the question naturally arises, how much should we remove? If we remove all we can find we may expect the condition of hypothyroidism to develop. If we remove only a part we may not relieve. In this event we can at a later stage re-

move more if necessary. What we aim at, is to remove all of that part showing hyperplasia, leaving behind sufficient of the normal gland to supply the bodily requirements.

In performing the operation of partial thyroidectomy, I prefer the technique of Wathen,⁹ of Louisville, in which the use of the scissors replaces the knife, and all the structures beginning with the skin, and later, the thyroid, are elevated, put on the stretch, and approached from the under surface. This lessens the hæmorrhage, makes the work more rapid and safer, and allows of easier blunt dissections being made, and, most important of all, allows of less handling of the gland, with its consequent effect of expressing a large amount of the toxin into the system at the operation. It may or may not be necessary to cut through, with subsequent suture, the ribbon muscles to secure an easier access to the glands. The further important points are: to prevent shock; hæmorrhage; injury to the recurrent laryngeal nerve; interference with, or removal of the parathyroid glands; collapse of the trachea; infection, and air embolism; and to provide for drainage through a tube for twenty-four hours or longer, through a separate opening below the line of incision. It is almost unnecessary to add that the work should be done under light anæsthesia, and as rapidly as possible commensurate with safety. In the after-treatment patients should be warned to lead quiet lives for at least a year following the operation, for they usually feel so much better in about two weeks, that they may go to extremes unless warned. The pigmentations and discolouration of the skin are usually much more marked for a few days after operation, and in the course of a week or two clear up almost completely. For twenty-four or twenty-eight hours following operation the pulse rate is usually markedly accelerated and patients should be carefully watched.

In conclusion let me refer very briefly to the ultimate results that may be looked for.

C. H. Mayo⁶ reports 75 per cent. of cures in patients he has been able to trace after surgical treatment with an operative mortality of from 1 to 4 per cent., and reports within the last year two hundred and seventy-eight consecutive cases without a death.

Dr. Theodore Kocher⁷ reports a mortality of 3 per cent. in a series of five hundred and thirty-five patients, and concludes "that the disease should be surgically treated, and operative intervention should be undertaken at the earliest possible moment."

Kocher, Sr., reports that there is not a single case in which the patient has not been much benefited. In 83 per cent. of his cases

a cure is reported; 73 per cent. of cases with primary disease were cured, and 92 per cent. of cases with disease combined with ordinary goitre were cured; 100 per cent. of cases of vascular goitre were cured.

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FOLLOWING the recent exposure in Chicago of quack doctors, who exist there, as elsewhere, only by virtue of the use of the newspapers, the city council has passed an ordinance intended to prevent false and misleading advertising in Chicago. It follows closely the Printers' Ink Bill, which, with modifications, has already been enacted into law in sixteen states. The statute not only reaches the quack who depends on newspaper advertising for the prosperity of his swindling operations, but is also sufficiently broad to cover other fraudulent advertising, in particular, advertisements of fake auctions, fire sales, bankrupt sales, etc. It forbids the publication of any "advertising which contains assertion, representation, or statement which is untrue, deceptive, or misleading." —*Journal of the American Medical Association*, January 10th, 1914.

SMALLPOX AND CHICKEN-POX

By H. W. HILL, M.B., M.D., D.P.H.

*Director, Institute of Public Health, London, Ontario;
Late Director, Division of Epidemiology, Minnesota State Board of
Health.*

THE spread of smallpox depends in part on wrong diagnoses; in part on concealment of cases; in part on the failure to report known or suspected cases; but chiefly on the neglect of vaccination. Mild cases often are confused with chicken-pox and, in general, many may not be seen by a physician unless a severe case calls for a general "round up," while many are never seen by physicians at all. Hence many alleged chicken-pox cases are smallpox and some alleged smallpox is really chicken-pox. The occasional failure to distinguish between mild smallpox and chicken-pox is due less to lack of information concerning smallpox than to unfamiliarity with, or disregard of, chicken-pox. The physician who has the chance to see either smallpox or chicken-pox should not fail to study minutely the lesions of the cases he encounters in correlation with the age of the lesions, especially during the acute stages.

Smallpox of the now prevailing type is regarded as a very trivial disease, because its physical injuriousness is far less than that of whooping-cough or measles; but from the standpoint of the future, its importance is enormous. Its existence means a large contempt for the disease, coupled with much disregard of vaccination.

The following figures* summarize the experience of Prague during twenty-one years with a severe type of smallpox; they need no comment:—Unvaccinated persons, 90,130; cases in unvaccinated persons, 7,642; deaths in unvaccinated, 2,224. Vaccinated persons, 3,005,578; cases in vaccinated persons, 8,178; deaths in vaccinated, 423.

Each 10,000 vaccinated persons yielded 27 cases and 1.4 deaths.

Each 10,000 unvaccinated persons yielded 830 cases and 247 deaths.

* Welch and Schamberg, "Acute Contagious Diseases."

The unvaccinated yielded, in proportion, 30 times as many cases and about 180 times as many deaths as did the vaccinated.

Clinical Types of Smallpox

Smallpox (variola) is one disease whatever its degree of severity. According to circumstances (the individual resistance of the particular patient, the individual virulence of the particular germ, and the size, probably also the frequency, of the dose) smallpox may affect different patients with different degrees of severity. Thus arise certain clinical types, with many degrees in each:

(a) Discrete smallpox, i.e., with the individual lesions well separated.

(b) Confluent smallpox, i.e., having the lesions fused together.

Most cases of smallpox show both discrete and confluent lesions. These terms are therefore relative, a discrete case usually showing some confluence and a confluent case usually showing some discrete lesions.

(c) Hemorrhagic smallpox, i.e., accompanied by hemorrhages into the skin. This is the type which is often called "black smallpox." Minor capillary hemorrhages are not infrequent in the severe types of smallpox and are usually unnoticed or disregarded. The term hemorrhagic is therefore also relative. The most striking form of hemorrhagic smallpox is that in which hemorrhages precede the eruption, death occurring promptly. Strictly speaking, these cases are *sine eruptione*, but only because the patient dies before the eruption has time to appear. The term *sine eruptione* is, in practice, restricted to cases in which the eruption fails to appear despite survival beyond the prodromal stage.

(d) Varioloid, i.e., smallpox modified as regards clinical symptoms by vaccination. Such modification occurs, first, when the absolute protection afforded by recent successful vaccination has partially run out, as it is likely to do after five to seven years from the date of vaccination, and secondly, when an unvaccinated person exposed to smallpox is vaccinated during the incubation period. If less than three days have elapsed since exposure, a successful "take" usually prevents an attack of smallpox entirely. If more than three but less than ten days have elapsed since exposure, a light attack (varioloid) is likely to supervene. If over ten days have elapsed, vaccination is unlikely to have any marked effect in modifying the subsequent attack.

Vaccination rarely takes in smallpox, if performed after the fever begins, and practically never, if performed after the eruption

appears. Ker states that a take following vaccination made for diagnostic purposes after the third day of the eruption conclusively eliminates smallpox. The proper thing to do is to vaccinate all exposed unvaccinated persons without regard to the time which is alleged to have elapsed since exposure.

(e) Abortive smallpox. A few persons are by nature wholly immune to smallpox. Some persons are by nature partially immune, sufficiently so to prevent the regular course of symptoms, but not sufficiently to protect them absolutely. In such persons, a very light attack with atypical lesions and quick recovery may occur. These cases are described as "abortive." Smallpox modified by artificial immunity (vaccination) is called varioloid; smallpox modified by natural immunity is called abortive.

(f) Smallpox without eruption. This form is probably due to a somewhat greater degree of partial immunity than that which yields the abortive form. The general disturbances, pain, fever, headache, etc., are similar to those of true smallpox, at least in the recognized cases, which are considered very rare. The chances are that abortive and *sine eruptione* varieties of smallpox are really not uncommon in smallpox outbreaks, just as similar forms of scarlet fever, diphtheria, measles, typhoid fever, etc., accompanying outbreaks of the latter diseases, are not uncommon, but these forms are usually unrecognized and therefore considered rare.

(g) Mild smallpox. This is as truly smallpox as are the types above described, and deserves equally a distinctive descriptive term. It presents difficulties in diagnosis only because of its mildness, not on account of any qualitative difference from the more typical strains. It is not varioloid, nor is it hemorrhagic, abortive, or *sine eruptione*. It is usually discrete, occasionally partially confluent.

Mild smallpox is true typical smallpox, but is "scaled down" in severity, in the number of lesions, and in duration. It does not "run to the time schedule" so closely as the more severe forms. The incubation period averages a day or two longer and is slightly more variable. The prodromal stage is often light, although also often severe, and is not usually observed to be as closely limited to two or at most three days as in the more severe forms. The lesions have the same relative distribution,* character and stages as the lesions of the severe type, but the duration of the different stages is apt to be shorter. Pustulation is moderate, light, or

*Provided there are lesions enough to furnish any basis for determining relative distribution.

even not appreciable and is not as a rule accompanied by marked secondary fever; crusting, decrustation, scabbing, etc., are relatively rapid in progress.

Too often the attempt is made to "size up" such a case on general principles and to regard it as not smallpox, merely because the symptoms are mild, the lesions few, and the course short. This policy throws all expert differentiation to the winds, abandons all exercise of professional observation, and adopts the lay attitude: "It is too mild for smallpox, therefore it is chicken-pox." As well might we follow the slogan of thirty years ago with regard to diphtheria: "The cases that die are diphtheria; the others are not."

Differential Diagnosis of Smallpox

The most common differentiation called for is that between smallpox and chicken-pox. As German measles is to measles proper, and Duke's disease to scarlet fever, so is chicken-pox to smallpox—analogue to it, but wholly distinct from it. Neither protects against the other; neither ever produces the other; each breeds true. Clinically, the distinctions between mild cases of these diseases and their corresponding imitators are often somewhat difficult, to those whose experience is limited. *Both* diseases require intimate study, if reliable results are to be secured. In practice the most important points to consider in differentiating smallpox and chicken-pox are:—

1. History of association with frank cases within the incubation period.
2. Definite history of previous chicken-pox, smallpox, vaccination.
3. Date on which first fever, headache, etc., appeared.
4. Date on which lesions appeared.
5. Location of the first lesions noted.
6. Quantitative distribution of the lesions in relation to the covered and uncovered portions of the body.
7. Character of the individual lesions in correlation with the number of days they have been in existence.

In approaching the diagnosis of a doubtful case, the derivation of the present case from, or its ability to give rise to, a frank case, is extremely important, but such evidence may not be available. It also happens at times that the history concerning vaccination, the existence or character of prodromes or even the exact date of eruption is indefinite or unobtainable. In dealing with mild small-

pox, the history of a previous attack of chicken-pox or smallpox is often not very conclusive, since the previous attack, being subject to similar difficulties in diagnosis, may have been itself wrongly named at the time when it existed. Hence careful study of the distribution and especially of the character of the lesions themselves becomes of the greatest importance.

Differentiation of Lesions

On general survey the smallpox patient shows round lesions only,* not crenated at the margins, uniform in size, and unbroken. They are chiefly on the face and limbs. The chicken-pox patient shows round *and oval* lesions, usually crenated at margins, varying widely in size, and almost always more or less broken or disfigured; they are chiefly on the body.

On close examination the smallpox lesion is found relatively small, round, and, in the papular, vesicular, and pustular stages, very firm. It is deep-seated; the vesicles and pustules are therefore thick-walled, and consequently rupture only with great trauma; thus, very firm pressure and hard rubbing with the ball of the finger scarcely impress the smallpox papule, vesicle, or pustule at all. Of course it is *possible* to break the smallpox vesicle or pustule with the fingernail by firmly digging into the margin of the elevation. When this is done, the thick epithelial wall of the vesicle comes away, maintaining its shape, like the top of a neatly cut egg. In contrast, the chicken-pox vesicle, whatever its size, is like a half-balloon, thin-walled, tense, with clear contents, giving the "pearly" appearance, and is quickly broken down at the lightest touch, the collapsed wall being soft, flimsy, shapeless—a mere rag.

Naturally this differential point can be made use of only if intact vesicles can be found. This is seldom true in chicken-pox, if the eruption is of more than three or four days' standing, because the chicken-pox vesicles are so delicate that they are ruptured by the friction of clothing or other accidents, as well as by scratching. Hence, as a rule, very few or even no distended vesicles can be found in chicken-pox after the first two or three days, the lesions being either completely decapitated, showing merely small raw or crusted pits on the vertex of low, round, or oval elevations, or else pits of the same character, overlain by the macerated, opaque, white, shrivelled, wrinkled, empty, easily brushed off epithelial rag,

*The shapes of confluent lesions depend of course upon the number and position of the round lesions forming the margins of the confluent area.

representing the remnants of the previously distended and then, therefore, thin and transparent walls of the vesicle, now ruptured. The very fact that plentiful unruptured vesicles present themselves for examination is itself presumptive of smallpox, although this condition may be found in chicken-pox at times in the first day or two of the eruption. The presence of plentiful broken-down vesicles is itself strongly presumptive of chicken-pox. I have seen a plentiful crop of chicken-pox vesicles on the back which had been evacuated of their contents wholesale by rubbing the back firmly with oil or vaseline, at the height of the vesicular stage, to relieve itching. The oil or vaseline, rubbed in as the vesicles were emptied and smoothed down, had kept these "epithelial rags" in place and prevented them from drying out. The slippery oil prevented the examining finger from securing a foothold to dislodge the rag; and the vesicles, being already empty, could not be further emptied by pressure. This condition had led to the diagnosis of smallpox, on the ground that the "vesicles" were firm and resisted the efforts to break them down! It must be confessed that at a little distance the smooth, yellowish white caps, lying on the summit of the engorged bases of the vesicles, would have suggested at the first glance smallpox, but for their irregularity in size and shape. On close examination the differentiation was easy.

The reddened areolæ (halo) surrounding the pocks of the two diseases are often similar, but the smallpox areola (until secondary infection late in the disease may alter conditions) is generally narrow, and, since it surrounds a round lesion, is itself circular. The chicken-pox areola is usually wider, the depth of colour diminishes more gradually towards a more diffuse edge, and when the lesions are oval the areola corresponding to them is oval also. Finally the chicken-pox areola frequently, although by no means invariably, shows irregular flaming offshoots, which give the whole the appearance of a bright-red ragged star.

Some prevalent misconceptions concerning the differential diagnosis are:—

1. That chicken-pox occurs only in children. It is true that the vast majority of chicken-pox cases occur at or before twelve years of age, but cases in older children and even in adults are by no means uncommon. I have seen it in a woman of fifty-three; and in many young adults.

2. That smallpox does not invade the scalp. It is true that chicken-pox usually invades the scalp while smallpox sometimes does not, but the point is by no means final.

3. That smallpox alone invades the palms and soles. It is true that smallpox almost always invades the palms or soles, or both, but chicken-pox not infrequently shows one or more palmar or plantar lesions.

4. That smallpox alone presents lesions in the month. Almost every case of chicken-pox shows some mouth lesions.

5. That smallpox lesions are umbilicated (dimpled), while chicken-pox lesions are not. This last statement might be made almost without reservation, if confined strictly to the vesicles of the two diseases. But the umbilication of the smallpox vesicle disappears on pustulation (perhaps by liquefaction of the restraining bands which are supposed to produce the "dimple"), while the subsequent drying out of the pustule reproduces a pseudo-umbilication in the late pustular stage. The chicken-pox vesicle, being swept off or broken, leaves the slightly pitted summit of the papular base of the vesicle exposed. On drying, and especially after crusting, the lesion thus evolved often presents a certain dimple, sometimes mistaken for umbilication. This "umbilication" is wholly different in stage, cause, and structural features from the true umbilication of the smallpox vesicle, and should never be confused with it. It is not even analogous to the secondary umbilication of smallpox, for in the latter the epithelium covering the pustule is still intact, although dry.* Occasionally, one or more chicken-pox vesicles, at an early stage, may show a light dimpling, or even umbilication. A diagnosis should never be based on the condition of one or two lesions, but on the prevalent type. I have seen generalized vaccinia, developing eight days after vaccination, diagnosed by high authority as smallpox, and by other high authority as chicken-pox, both errors depending on attaching too much importance to the peculiar character of one or more lesions, while overlooking the predominant characteristics of the predominant type.

Occasionally chicken-pox vesicles of the forehead and especially of the palms or soles, may be found more deeply seated or having over them a tougher epidermal covering than usual. The only lesson of this fact is, that the lesions of the face, palms, and soles should not be used for the testing of the differential points.

Differential Diagnosis of Severe Smallpox, Mild Smallpox, and Chicken-pox

The case of SMALLPOX will show:—

*It is stated by J. M. Armstrong that smallpox papules under moderate magnification show umbilication also.

1. An incubation period (i.e., from exposure to earliest symptoms—not to eruption) of practically twelve days (in mild smallpox fourteen days). The incubation period can be determined accurately only in cases where known exposure occurs on a given date, with no exposure before or after, the date of earliest symptoms resulting from such exposure being also definitely fixed.

2. No definite history of previous attack of smallpox. When mild smallpox has prevailed for years, often confused with chickenpox, and *vice versa*, this history is of little account, especially when the previous diagnosis was made, as often happens, by the laity. Examination for healed pits should be made. Round pits indicate smallpox; oval pits, clean cut, indicate chickenpox. Confluent smallpox may yield pits of irregular shape. In mild smallpox, and in chickenpox, pits of any kind may be few and small.

3. No history of successful vaccination within five to seven years. Careful examination for vaccination scars should be made.

4. Prodromes, lasting two or, at most, three days, headache, backache, fever, epigastric pain, chills, sudden severe onset. Mild smallpox sometimes presents very indefinite and trivial prodromes. When definite, a history of three or four days or more of prodromes may be offered. (See 5.)

5. First signs of eruptions on third or fourth day of attack. In mild smallpox the earlier eruption, when sparse, is often unnoticed for a day or so, thus prolonging the *observed* interval between onset and eruption.

6. Eruption beginning on face and wrists. In mild smallpox, the lesions are sometimes so few that the earliest ones are overlooked until the full crop has appeared.

7. Eruption most profuse on skin not covered by clothing, i.e., face and wrists; also the legs, despite the covering of the latter. In mild smallpox, with very sparse lesions, there may be too few lesions to permit any real comparison of relative abundance at different points.

8. Palms and soles often attacked. In mild smallpox, one or two lesions in one palm or one sole may be all that can be found in these locations.

9. Eruption develops in one crop, the lesions appearing steadily for twenty-four to forty-eight hours; the face lesions usually further developed than the body lesions. In mild smallpox aborted lesions, i.e., not following out the regular stages, are sometimes found.

10. *Lesions round at all stages.* Margins not crenated. All those of the same stage of development are usually of the same size.

The stages are:—(a) "Flea-bite" macules, each lasting twenty-four hours, exist during the first day of eruption (third day of disease). With the appearance of the eruption, the systemic symptoms improve; but with very mild prodromes, this improvement can hardly be observed. (b) "Shotty" papules (pimples), each lasting twenty-four hours, exist during the second day of the eruption (fourth day of disease). (c) Umbilicated "shotty" vesicles (blisters), each lasting twenty-four to seventy-two hours, exist during the third to fifth day of eruption (fifth to seventh day of disease). (d) Firm opaque pustules, each lasting four to six days, exist during the sixth to twelfth day of eruption (eighth to fourteenth day of disease). With pustulation, the secondary fever begins, but in mild smallpox pustulation is usually very innocuous and little or no secondary fever is observed. (e) Firm crusts appearing about the thirteenth day of eruption (fifteenth day of disease). Secondary or pseudo-umbilication, due to drying, may be found about this time. (f) Dense scabs and deep-seated, tenacious, "mahogany" plaques—the latter still covered with the original epithelial wall of the pustule, now flattened out again—developing as drying out continues. They are variable in duration lasting many days or weeks in severe neglected cases. In mild smallpox the absence of severe pustulation often obviates the formation of the deep-seated tenacious plaques. Those formed are rather superficial and are removable without great difficulty. It is to be noted that as some lesions develop earlier than others it is possible to have, during the first twenty-four to forty-eight hours of the eruption, macules and papules, and even vesicles together; during the next twenty-four to forty-eight hours papules, vesicles, and pustules; thereafter, however, vesicles and pustules alone, later followed by pustules and crusts, will be found; finally, crusts, scabs, and plaques, leaving pits as they disappear. In mild smallpox, aborted lesions sometimes add to the variety of conditions presented.

11. Pitting, especially following marked pustulation, is deep and permanent; the pits are red for months, then white. Unless extended by impetigo, or fused by confluence, the pits are round. Mild smallpox yields few and small pits only, as a rule.

The case of CHICKEN-POX will show:

1. Incubation variable, but from two weeks to seventeen days as a rule (see smallpox 1).
2. No definite history of a previous attack of chicken-pox (see smallpox 2).
3. A history of successful vaccination within five to seven years,

or a definite history of previous smallpox, practically eliminates smallpox, and therefore admits the possibility of a diagnosis of chicken-pox; absence of history of one or other or both of these does not, of course, eliminate chicken-pox.

4. No history of prodromes usually; if any, chiefly in adults, and for not over twelve hours preceding the eruption.

5. First signs of eruption *noticed* in first twenty-four hours of illness, i.e., the systemic disturbance is usually synchronous with or immediately precedes eruption.

6. Eruption beginning on back, chest, or face.

7. Eruption most profuse on skin covered by clothing, i.e., on the body.

8. Palms and soles may sometimes show lesions, less constantly and less abundantly than in smallpox, however.

9. Eruption appearing in successive crops, on successive or alternate days.

10. *Lesions round and oval*, with much variation in diameter, even at the same stages of development; margins often crenated (scalloped). Each crop passes quickly through the following stages:—(a) Macules, each lasting a few hours. (b) Soft, superficial papules (pimples), each lasting a few hours. (c) Clear, thin-walled, tense vesicles (blisters), each lasting a few hours. These are easily destroyed and leave then "cupped" or "pitted" elevations, raw, red, and weeping, but quickly crusted. When the vesicle is ruptured, without total removal of the cap, a white, opaque, shriveled rag of epithelium, lying more or less loosely over the pit, remains. (d) Theoretically, pustules follow. Practically, the vesicles are almost always destroyed before pustulation can occur. But I have seen a vesicle, on the back of a finger, and preserved from rupture by a plaster cast, develop into a tense, thin-walled, oval, half-balloon pustule, nearly a quarter of an inch long. (e) Crusts, lasting a shorter or longer time according to treatment, etc. Each crop completes its cycle in two to four days. In the first week macules, papules, vesicles, intact or broken, and crusts may be found together. Thereafter the earlier forms disappear, and in the second week crusts alone or in great predominance are found. The older lesions are very often complicated by presence of impetigo.

11. The pits are few and superficial, often oval. When extended by severe forms of the impetigo, which so commonly affects chicken-pox lesions during and after the second week, the pits may be irregular in outline.

General Observations

In smallpox the worst systemic disturbance and suffering are often found during the prodromes, and improvement, if only temporary, follows closely on the appearance of the eruption. Severe prodromes may be followed by either mild or severe eruption; mild prodromes, usually by mild eruption. The extent of the eruption on the face is a fair index of the general severity of the attack. In chicken-pox the practical absence of prodromes means that the first appreciable systemic disturbance, if there be any at all, begins with the eruption and continues for a few days thereafter.

In smallpox itching during the early stages of the eruption is not usually a marked symptom; nor does scratching injure the lesions much, on account of their deep-seated and tough-walled character. In chicken-pox itching is highly characteristic, and since the relatively superficial and thin-walled lesions are very fragile, they are easily destroyed, not alone by scratching, but by every form of contact. This feature is in itself of very strong diagnostic import.

In smallpox the thick walls of the pustule permit comparatively little evaporation; the pustule, in shrinking, shrinks into the skin, and a hard, opaque, brown, very tenacious scab is often formed. This is especially true of the lesions of the extremities, particularly of the palms and soles. In chicken-pox the vesicle, if not wiped off or collapsed early, shrinks by evaporation to a brittle, but still somewhat elevated cap, very easily broken off or dislodged. In mild and abortive smallpox and in varioloid similar caps are at times found on the *body*.

*General Differential Diagnosis of Smallpox**

During the invasive stage, and before the appearance of the prodromal rashes, the diagnosis must be made from other infectious diseases having an acute onset, i.e., measles, scarlatina, typhus, influenza, etc. Diagnosis at this stage depends primarily upon the presence of an epidemic, and the history of exposure within the appropriate incubation period. In the case of the diseases indicated below, the following points should also be considered:

SCARLATINA. With rash absent or "missed." Condition of tongue, cervical lymph-glands, tonsils, nose discharges, injection

*Modified from A. E. Thomas, "Public Health," Vol. xx.

of soft palate (enanthem), circumoral pallor, history of vomiting and sore throat. Backache, absent or slight.

MEASLES. Coryza, photophobia, lachrymation, Koplik's spots, backache absent or slight.

TYPHOID FEVER. Although this has not an acute onset, many cases when smallpox is rife are reported as smallpox. Attention should be paid to the gradual rise of temperature at onset, "step ascent" on the chart; early epistaxis or deafness, not common; Widal reaction; tympanites; condition of the tongue; spleen, stools.

INFLUENZA. Here the diagnosis may be impossible until the time interval for the appearance of the rash has passed. The muscular soreness and prostration are both generally much more exalted in influenza than in smallpox. The history of exposure and the presence of an epidemic are of special importance here. The bacillus may sometimes be isolated from the sputum.

MENINGITIS. The history, with the presence of a possible cause, e.g., suppuration of the middle ear or a tuberculous focus in a lung, is important. The subsequent course, with the attending palsies, generally clears up the issue. Backache is uncommon.

CEREBROSPINAL MENINGITIS. Retraction of the head; rigidity of the neck muscles; Kernig's sign; possible presence of the coccus in the nasal discharge or in the fluid obtained by lumbar puncture.

After the appearance of the rash the diagnosis must be made from the following:—in all stages, chicken-pox, acne, syphilis, drug eruptions, glanders, scabies, lupus, especially on the face; in the papular stage, prodromal rash of measles, erythema nodosum, lichen planus; in the vesicular and pustular stages, herpes, erythema iris, and erythema bullosum; in the pustular stage, impetigo and pustular scarlet fever.

"Minnesota Method" of Controlling Smallpox

Much misunderstanding exists as to this method. It is commonly stated that "nothing is done for smallpox, there is no quarantine," etc., all of which is error. Under the regulations, the chief steps taken are:—

1. The patient is isolated in a suitable place, preferably with a vaccinated attendant.

2. All persons exposed to him on and after the date of earliest symptoms, at home, at work, etc., especially school children, are examined.

3. Of those exposed to the patient, all who can *prove* successful vaccination within seven years, or a previous attack of smallpox, may be dismissed. Those remaining must be vaccinated at once, or go into isolation for three weeks.

4. The premises where the smallpox patient is confined must bear a warning placard indicating that smallpox exists there.

5. Persons vaccinated successfully within seven years, those who have had smallpox, and those who, failing either, submit to immediate vaccination, may enter or leave the placarded premises without restriction.

6. Persons not thus protected, may enter the premises, but must then stay there, unless they become vaccinated.

7. In epidemics, teachers and children who have not been vaccinated, and who have not had smallpox must be excluded from school for three weeks.

These methods are so simple, just and efficient, placing the penalties only on those who refuse to be vaccinated, and removing all restrictions from those who submit, that they have been adopted gradually over wide areas in the United States. The carriage of smallpox by "third parties" is rare; vaccinated students are given every opportunity to see smallpox, and thus learn to make the diagnosis. Hundreds of students thus see the disease every year without instances of carrying the disease occurring.

NEXT year it is proposed to add to the Vancouver General Hospital a maternity hospital, an infectious diseases building and administration quarters, at a cost of from \$600,000 to \$700,000. To enable the board to do this, a deputation recently approached the provincial government with the request that a grant of \$250,000 be made. It was pointed out that quite fifty per cent. of the cases treated in the Vancouver Hospital came from outside the city, that more than a million dollars had been expended already on the buildings of the hospital, and that the provincial government had contributed to this amount only thirty-five thousand dollars. The request is under consideration.

Editorial

THE NEW QUACKERY

RADIUM is the philosophers' stone in its newest form, that fabled element, mixture, or solid substance, which should have the property of converting all base things into gold. What the alchemists and necromancers eagerly sought our new philosophers have found. At least, they tell us so; but in their telling we do miss that self-restrained, serene, and rational calm, which is the mark of all philosophers, who are so in reality.

The profession of medicine is very old and very wise and, it may be added, very sceptical. It has too often gone out into the wilderness at the cry, "Lo, here: Lo, there," and found only a reed shaken by the wind. It is now disposed to ask of the philosopher not what he says but what he can prove. The rôle of the gad-fly has never been an attractive one, but that humble creature does puncture many a wind-egg.

Any new half-truth in medicine is quickly seized upon with enthusiastic ignorance to benefit the sick, or with cunning design to impose upon the credulous. All quackery does not lie outside the boundaries of the medical profession; and it is hard to distinguish between credulity, pretence, and charlatanism.

For the moment sera are enjoying a respite. They are finding their own place either in the equipment of the physician or in the limbo of exploded and forgotten fallacies. Their place is now occupied by radium, and reputations of a kind are being erected upon it. The moment is well chosen. The public mind is blinded by the glamour of the emanations which issue from this substance, and no discovery was ever

made which was not instantly seized upon for therapeutic purposes.

The offence has come from within the profession. The medical journals recount much ill-considered opinion and many incomplete investigations in which surmise takes the place of evidence. The lay press has not been slow in taking up the cry, and the daily newspapers now estimate a surgeon in terms of the amount of radium he owns, as the worth of a woman is judged by the number and brilliancy of her diamonds. Religion, too, is pressed into the service. One surgeon of great reputation has declared that radium is that Sun of Righteousness which was to arise with healing in his wings.

All that can be said at the moment is that the emanations from this metal do exercise some effect upon cell activity; but the same is true of the ultra-violet rays, or even of light itself. Already reports of bad omen are coming in, of healthy tissue destroyed, and of connective tissue cells being stimulated into a sarcomatous growth.

Cancer is such a dreadful malady that sufferers will seize with avidity upon any device for its cure or amelioration. The usefulness of radium in cancer is by no means settled. It is still under investigation by competent observers; and the best the inexperienced person can do is possess his soul in patience and wait for results from well authenticated laboratories.

THE SOCIETY OF AMERICAN BACTERIOLOGISTS

THE recent stoppage of the water supply of Montreal resulted in the attendance at the meeting of the Society of American Bacteriologists being reduced to about half of what was expected. This did not prevent the meeting being one of great interest.

The society differs from the Association of Pathologists and Bacteriologists in that it brings together workers in all branches of bacteriology, what we may term medical bacterio-

logy forming but one section of its activities. Its main service lies in bringing together workers in the bacteriology of water and milk, agricultural bacteriologists and public health workers.

Professor Winslow, this year's president, who gave a most admirable address upon the moot question of species and varieties of bacteria, may be taken as the type of members of the society. He is the director, and indeed the instigator, of a most useful section of the activities of the National Museum of Natural History in New York; a section devoted to the collection and preservation of all cultivable varieties of bacteria. To this any worker can send new varieties isolated by him, from it he can obtain for study series of closely allied forms. This department has already done much to aid in establishing and placing bacteriology on this continent on an excellent footing.

The meetings of the society were held at McGill University on December 31st and January 2nd. On New Year's Day the sessions were held at Macdonald College where Principal Harrison, himself a foremost bacteriologist, entertained the members.

The public interest in the meeting settled mainly around the communication by Dr. N. S. Ferry, of Detroit, who has been widely announced in the press as heralding the discovery of the microörganism of scarlet fever. In this case we feel it our duty to our readers to point out that Dr. Ferry made no such announcement. He described a coccus which he found frequently in the throats of scarlet fever patients somewhat similar to an organism announced a few years ago by Dr. Claus, but at the same time he admitted that he had been unable to reproduce the disease by inoculation of a pure culture of this organism, and that until it was possible to reproduce the disease it would be absurd to speak of this as the specific organism. At most he recorded one striking observation, namely, that whereas nurses at the Detroit Contagious Diseases Hospital had previously been liable to

catch the disease from the patients, since he had started to vaccinate them with pure cultures of this organism, during two years or more there had not been a single case of the disease in the nursing staff, until through his absence for a few months, the supply of the vaccine had ceased, when some of the nurses who had not been vaccinated came down with scarlet fever. These are interesting observations, but certainly they do not prove that the organism in question is the specific cause of the disease.

RECIPROCITY

IN a recent address on "Examinations, Examiners, and Examinees" (*Lancet*, October 11th, 1913) Sir William Osler pointed out the failure of our present "Chinese" system of education, in which the passing of examinations is often the chief aim of the student, and pleaded earnestly for a change. After outlining a plan, as a measure of relief, whereby the daily work of the student can be made to count largely in the final estimate of his fitness, he writes as follows:—"And the system is being adopted. A few months ago I went into the beautiful clinical and pathological laboratory of the new Toronto General Hospital, and in one room I found an examination in pathology going on. The candidate had a set of cards in his hands, on each of which were written the details of the post-mortem examination he had made with a careful discussion of the case. Pass or pluck really depended on the cards a man held. He brought his marks with him—instruction and examination had gone hand in hand. I was delighted to hear from Professor MacKenzie that the system, introduced at McGill by my pupil and successor, the late much lamented Wyatt Johnston, had proved very successful in both Canadian schools." At Toronto and McGill the final examinations are being reduced in number and importance, while less formal tests are held throughout the year. At the end of the first year, for example, there are only three

written examinations, in physics, chemistry, and biology, the latter including questions on botany, anatomy, histology, and bacteriology. The plan is gradually being applied to the other years.

Since 1908 committees of the medical faculties of the two universities have met in annual conference to discuss the curriculum. While it was recognized that it was neither practical nor desirable to make the curricula identical, the length and order of the courses have been so correlated, and such uniformity has been introduced into the general requirements and into the methods of teaching and examining, that it is now possible for the student to change over from one school to the same grade in the other with the minimum of formality and without loss of time. Not many students have so far made use of this privilege, but it is a practice that might well be encouraged. The facilities at both schools are now so excellent, and so evenly balanced, that neither need fear that the migration would be in one direction. In Germany it has been a common custom for the undergraduate to study at more than one university. No doubt it must result in a broader outlook, and it should be a salutary corrective of provincialism.

Another result of these conferences is that the regulations at both schools have been made more strict. No student is allowed to register until matriculation is completed, and each year's work must be satisfactorily accomplished before that of the next can be begun. When supplemental examinations are allowed, the student must work for them during the summer under an approved tutor. One of the most difficult questions under discussion has been the teaching of physics and chemistry, which at present crowd the first years of the curriculum. A joint committee has made recommendations for the improvement of the teaching of these subjects in the high schools, for though it is now adequate in many of the Ontario schools, it is generally unsatisfactory elsewhere. It has also been suggested that the only way to meet the difficulty

is to require a preliminary year in arts or lengthen the medical course to six years.

At a recent conference it was decided to try the experiment of having extra-mural co-examiners. Accordingly, this year two McGill professors will assist in the examinations in their subjects at Toronto, and *vice versa*. Owing to the death of Professor Alcock the chair of physiology at McGill is at present vacant, and it is typical of the friendly relations, the admirable spirit of reciprocity, existing between the two leading schools, that Professor Brodie, of Toronto, has offered to give a course of lectures at McGill this session. The offer, needless to say, has been gladly accepted.

THE LARYNGOLOGISTS

THE teaching of the specialties and the training of the specialist are questions which are much to the fore. An interesting report has been issued by a committee which was appointed by the American Laryngological, Rhinological and Otological Society to consider the best methods to be followed in the teaching of oto-laryngology in undergraduate and post-graduate schools. The committee consisted of three well-known specialists, including Dr. C. J. Gibb Wishart, of Toronto. In the case of the undergraduate the report recommends that he should be familiar with the anatomy of the parts, possess a practical working knowledge of the simpler instruments of examination, be able to recognize familiarly the normal appearance of the structures, be practically acquainted with the pictures presented by the commoner diseases of the organs involved and with their treatment. He should further be instructed to recognize the symptoms of serious complications, the wisdom of early associating the greater knowledge of the specialist in the care of his patient, and the dangers associated with all operations upon the parts involved, except in the hands of the competently trained specialist. The instruction should be given to small groups of students,

and should occupy at least forty hours of the student's time in each of the two final years. The clinical teaching should exceed the didactic in the proportion of at least three to one. Operations should not be included in such a course. A separate examination, preferably clinical, in oto-laryngology should form part of the final examination in medicine of all universities and licensing bodies.

The second half of the report deals with post-graduate work, and the committee is agreed that the time has arrived to standardize the degree of scientific attainment and of clinical training, which shall qualify those who wish to begin the practice of oto-laryngology as a specialty. The minimum requirements are outlined, and call for at least two years of special training, preceded by not less than two years of general practice or of mixed service in a general hospital. The special training should include six months of advanced scientific studies at a recognized university capable of providing the necessary facilities, and this should be followed by eighteen months of service as resident assistant in a special hospital or in the oto-laryngological service of a large general hospital. At the end of his training the candidate should be examined by the university, and if approved, should be given a higher degree, that of Ph.D. in oto-laryngology being suggested. A special committee of the society has been appointed to work out the details of his scheme. The success of a plan such as this, like that of the recently constituted American College of Surgeons, must depend upon an enlightened public opinion in the laity. Any serious attempt to prevent the exploitation of the public by ill-trained, self-styled specialists, ought to receive the hearty support of the profession.

THE next annual meeting of the Ontario Medical Association will be held in Toronto, on May 26th, 27th, 28th, 1914. The programme will be largely clinical.

IN conjunction with the annual meeting of the Ontario Provincial Board of Health, a meeting of the district officers of health was held December 23rd. The work done in the seven districts, into which the province was divided last year, has been productive of good results and by means of the sanitary surveys, in particular, a great deal of useful information has been acquired. An important feature of the meeting was a discussion concerning possible amendments to the public health act.

WITH the death of Weir Mitchell one of the most notable figures in American medicine has passed away. In the later years of his life Dr. Mitchell attained to so great a celebrity in the world of letters that his fame as a physician was overshadowed. He was a very great physician, and established a tradition which he acquired from his father and handed down to his son. His practice was based upon research at a time when the empirical method held full sway, and he had the rare quality of combining in himself the attributes of the scientist and the practitioner. To writers he was a writer, and to physicians, a physician. He has now a place beside Holmes in the public mind; and in the course of human events one other name will be added to the short but impressive list, namely, that of Sir William Osler. These three will constitute a trinity which any profession and any country might well contemplate with satisfaction.

A HOSPITAL, whose aims are charitable, is not precisely in the same category as a joint stock corporation whose aims are mercenary. In a company it is quite proper that a man's control shall be proportionate to his holdings, since the shareholders own the property and pay the staff and employees. But the donors to a hospital do not own it. A gift does not imply the acquisition of proprietary rights. Nor do they pay the staff, much less own it. On the contrary, it is the staff which creates the hospital. The common experience is that hospitals do best when the relations between the staff

and the donors are nicely balanced, and the question of control is left in abeyance. This old problem has come to the front in Toronto over the management of the Western Hospital. A Bill to revise the Act will come before the legislature, and it contains a provision that donors shall be entitled to a vote for every hundred dollars they subscribe. This would inevitably throw the control into few hands, and no surer plan could be devised for drying up the sources of charity.

THAT hospitals are responsible for the conduct of the physicians and nurses employed is the effect of a judgement handed down by Mr. Justice Macdonald in Vancouver, in the case of *Thompson v. Columbia Coast Mission*. This interesting case is reported in the *Victoria Times* of January 8th. Thompson secured a judgement against the Columbia Coast Mission and Dr. Stuart Tidey, the superintendent, and the jury awarded him the sum of one thousand dollars. The patient was an old man in the employ of a local company, and had been paying a dollar a month to the Mission in return for medical treatment, should it be necessary. He entered the hospital suffering from a dislocated shoulder, and, possibly on account of his advanced age, the results of the treatment were not satisfactory. Upon the justness of the verdict no comment can be made as we are not in possession of the facts. We desire merely to call attention to the principles which were laid down. The judge held that the plaintiff was in a different situation from that of patients in England, who might make a choice of the institution where they would be treated, as he must either apply for treatment to the Mission Hospital or forfeit any benefit from the moneys paid by him for that purpose. The practice of monthly payments for hospital and medical attention was general throughout the province, and it was unreasonable to suppose that in the event of want of care in such medical attention the workmen could only seek redress from the physician, who might not be financially responsible, and concerning whose appointment or dismissal he had no voice.

Book Reviews

THE PRACTICAL MEDICINE SERIES, comprising ten volumes on the year's progress in medicine and surgery. Under the general editorial charge of GUSTAVUS P. HEAD, M.D., and CHARLES L. MIX, A.M., M.D. Volume I, GENERAL MEDICINE, edited by F. BILLINGS, M.D., and J. H. SALISBURY, M.D. Volume II, GENERAL SURGERY, edited by J. B. MURPHY, M.D., LL.D. Volume III, THE EYE, EAR, NOSE AND THROAT, edited by CASEY A. WOOD, M.D., D.C.L., ALBERT H. ANDREWS, M.D., and GUSTAVUS P. HEAD, M.D. Volume IV, GYNÆCOLOGY, edited by E. C. DUDLEY, M.D., and H. M. STOWE, M.D. Volume V, PEDIATRICS, edited by ISAAC A. ABT, M.D.; ORTHOPEDIC SURGERY, edited by JOHN RIDLON, M.D., with the collaboration of C. A. PARKER, M.D. Volume VI, GENERAL MEDICINE, edited by F. BILLINGS, M.S., M.D., and J. H. SALISBURY, A.M., M.D. Volume VII, OBSTETRICS, edited by J. B. LEE, M.D., with the collaboration of H. M. STOWE, M.D. Price of the series of ten volumes, \$10.00. Single volumes: Vol. I, \$1.50; Vol. II, \$2.00; Vol. III, \$1.50; Vol. IV, \$1.35; Vol. V, \$1.35; Vol. VI, \$1.50; Vol. VII, \$1.35. Chicago: The Year Book Publishers, 1913.

These volumes form a series of ten issued at about monthly intervals, and covering the entire field of medicine and surgery. Each volume is complete for the year prior to its publication on the subject of which it treats. The series is published in the first place for the general practitioner, but the arrangement in several volumes enables those interested in special subjects to buy only the parts they desire. No better series, having regard to the price, is issued, and any practitioner who takes them will be well equipped for the year. The range is large and the treatment is critical as well as explanatory. For ten years we have been calling attention to this series, and always with approval.

DISEASES AND DEFORMITIES OF THE FOOT. By JOSEPH NUTT, B.L., M.D. Illustrated. Price, \$2.75. New York: E. B. Treat & Company, 1913.

The author has written this book not so much for orthopedic

surgeons as for general practitioners upon whom the responsibility falls of preventing deformities, correcting abuses, and treating minor diseases of the bones and joints. There are many painful and disagreeable conditions associated with the feet which may be cured by simple measures, and these are fully set forth. It does not confine itself to elementary procedures, but introduces the practitioner to the whole subject of orthopedics. The directions appear to be extremely sensible, and many of them can be carried out by a person who has no special training in the subject, apart from what he is likely to receive in the ordinary medical course.

MODERN MEDICINE. ITS THEORY AND PRACTICE. In original contributions by American and foreign authors. Edited by SIR WILLIAM OSLER, Bart., M.D., F.R.S., and THOMAS McCRAE, M.D. In five octavo volumes of about 1,000 pages each, illustrated. Volume I, Bacterial Diseases, Diseases of Doubtful or Unknown Etiology, Non-Bacterial Fungus Infections, the Mycoses. Price per volume, cloth, \$5.00, *net*; Lea & Febiger, publishers, Philadelphia and New York.

The publication of the first volume of this work is so important an event that it demands more than formal mention; and yet the authors are already so far-famed that formal notice will best serve to carry knowledge to the readers of the JOURNAL that the book has appeared. The time has gone by for eulogy and panegyric of these writers. They are their own surest critics, and they have not allowed the volume to go forth without forestalling all criticism which might be made by other hands. The book is precisely as they would wish it to be. The publishers have issued an announcement which we hasten to pass on to readers who may not have received it:

"This new issue is published under the same editorial management as the original work, and the corps of distinguished contributors is virtually the same. The unusual excellence of the material presented is thereby assured, and the reduction in the price of the complete work, now in five volumes, will make it appeal strongly to all practitioners of medicine, and especially to those who do not possess the original work. Comparison with the first volume of the previous edition shows that the text has been set in much larger and clearer type, the size of the page has been increased, and there are nearly two hundred pages more than in the original first volume. The many changes which have occurred in both the scientific and practical sides of medical knowledge in the last six years are shown

in the complete reorganization of the subject matter. The introductory chapter, the historical section, the article on the biology of the mosquito, the contribution on "inheritance and disease," the introductory section on protozoa and the article on life insurance have been omitted. On the other hand, new or practically new sections will be found on pellagra, beriberi, trypanosmiasis, Malta fever, and on electrical diagnosis in cardiac diseases. The condensation has been principally in the etiological and pathological portions, and throughout the work increased stress has been laid on diagnosis and treatment."

MATERIA MEDICA, PHARMACOLOGY, THERAPEUTICS AND PRESCRIPTION WRITING. For Students and Practitioners. By WALTER A. BASTEDO, Ph.G., M.D. Octavo of 602 pages, illustrated. Price, cloth, \$3.50 net. Philadelphia and London: W. B. Saunders Company, 1913. Canadian agents: J. F. Hartz Company, Limited, Toronto.

One is reminded by the appearance of this new and important book that physicians do administer medicine for the relief and cure of their patients. It is a book for the physician, and is especially timely at the moment when, as the author suggests, we are at the dawn of a new era of simple and practical therapeutics. Scepticism has already gone too far, and a new credulity has supervened upon the old. This book will do something to dispel both. If fewer drugs will be used, the treatment of the sick will be better,—that is the author's aim. He takes his stand upon critical laboratory research and compares the results with those which are obtained at the bedside, which, after all, is the final laboratory. The chapter on alcohol is extremely well done. It is moderate and just. Much attention is given to digitalis in the light of the newer discoveries. The book is critical besides being informing, and the grounds for criticism are carefully stated. The author believes that medicine sometimes cures, often relieves, and always consoles. He makes it his business to carry that belief to others.

PYORRHEA ALVEOLARIS. By FRIEDRICH HECKER, B.Sc., D.D.S., A.M., M.D. Illustrated. Price, \$2.00. St. Louis: The C. V. Mosby Company, 1913.

The author, Dr. Hecker, puts forward a fresh view of this disease. He believes that it is a constitutional rather than a local condition, and he points out the grave results which may follow from it, namely, tonsillitis, endocarditis, and a general infection. The book is an elaboration of this thesis and is the most complete monograph which we have yet seen dealing with the subject.

Books Received

THE following books have been received and the courtesy of the publishers in sending them is duly acknowledged. Reviews will be made from time to time of books selected from those which have been received.

THE HISTORY OF MEDICINE, WITH MEDICAL CHRONOLOGY, BIBLIOGRAPHIC DATA, AND TEST QUESTIONS. BY FIELDING H. GARRISON, A.B., M.D. Octavo of 677 pages, many portraits. Price, cloth, \$6.00 net; half-morocco, \$7.50 net. Philadelphia and London: W. B. Saunders Company, 1913. Canadian agents: The J. F. Hartz Company, Toronto.

PRINCIPLES OF SURGERY. BY W. A. BRYAN, A.M., M.D. Octavo of 677 pages, with 224 illustrations. Price, cloth, \$4.00 net. Philadelphia and London: W. B. Saunders Company, 1913. Canadian agents: The J. F. Hartz Company, Limited, Toronto.

A TEXT-BOOK OF THE PRACTICE OF MEDICINE, BY JAMES M. ANDERS, M.D., Ph.D., LL.D. Eleventh edition, thoroughly revised. Octavo of 1,335 pages, illustrated. Price, cloth, \$5.50 net; half-morocco, \$7.00 net. Philadelphia and London: W. B. Saunders Company. Canadian agents: The J. F. Hartz Company, Limited, Toronto.

A TEXT-BOOK OF PHYSIOLOGY; FOR MEDICAL STUDENTS AND PHYSICIANS. BY WILLIAM H. HOWELL, Ph.D., M.D. Fifth edition. Octavo of 1,020 pages, illustrated. Price, cloth, \$4.00 net; half morocco, \$5.50 net. Philadelphia and London: W. B. Saunders Company, 1913. Canadian agents: The J. F. Hartz Company, Limited, Toronto.

RESEARCHES ON RHEUMATISM. BY F. J. POYNTON, M.D., and ALEXANDER PAINE, M.D., D.P.H. Illustrated. New York: The Macmillan Company, 1914. Toronto: The Macmillan Company of Canada, Limited.

Retrospect of Medicine

RECENT ADVANCES IN TROPICAL MEDICINE

IN this review, the diseases mentioned are arranged in a classification which depends upon the systematic position of the parasite which causes the disease. Though such a classification may be inapplicable to some of the diseases of temperate climates, in which our knowledge of the cause and method of action of that cause is deficient; yet it can be applied to many of the diseases of the tropical climates. It is ideal and satisfying in its precision; for that reason it is followed.

Since many tropical diseases are the expression of an infection with a parasite which is transmitted by an intermediate host, advances in knowledge may be concerned with the parasite, with the intermediate agent, and with the host or hosts. Examples of matters with which the parasites are particularly connected are their classification, their morphology, their development, or, it may be, the description of new species. The transmitting agent is often an insect. An increase in our knowledge of its bionomics, or of the nature of the process undergone by the parasite while it is within its insect host, may lead to the suggestion of measures by which the insect can be exterminated and the propagation of the disease prevented. A study of the hosts, for it has been shown that other animals besides man may be infected by a parasite which causes human disease, may lead to a knowledge of the way in which the parasite produces symptoms, and of means by which infection with it may be cured, or avoided.

Bacteria and fungi are no less parasites than are intestinal worms, although the term, parasite, in popular usage, is usually reserved for the animal parasites. A large number of the most important diseases of the tropics are caused by unicellular animal parasites—by protozoa. A simple classification of the protozoa divides them into four main groups, the rhizopoda, flagellata, sporozoa, and the infusoria. To these groups is added a limbo—*incertæ sedis*—in which parasites of uncertain position are placed. Among the metazoa, or many-celled animals, which are important as parasites in the tropics, the worms and insects take important places.

The amœbæ are rhizopoda, and amœbic dysentery is one of the most important of tropical diseases. The classification of the amœbæ parasitic in man has been much simplified during the past year, and at present it is held that there are but two species, one of them is non-pathogenic—it can be cultivated, either in symbiosis with bacteria or on media smeared with organ debris; the other is pathogenic and can not be cultivated. The pathogenic amœbæ have been shown to be capable of producing abscesses in other parts of the body than the liver, and of causing phagedenic sores in the walls of an abdomen, with which pus containing amœbæ has been brought in contact by the draining of a liver abscess. Emetin, a principle obtained from ipecacuanha, has been shown to be capable of destroying amœbæ, and of arresting amœbic dysentery and liver abscess almost instantaneously. The treatment of bacillary dysentery has also advanced, and large doses of polyvalent serum, supplemented by nursing and a diet of sour milk, will save many cases.

The trypanosomes constitute one of the most important classes of the flagellata. They are transmitted by biting insects, and they cause serious disease in man—sleeping sickness—and in animals. Some of them are transmitted by the bites of tsetse flies, and it was thought that each trypanosome was probably transmitted by a special fly. It has been shown, however, that several trypanosomes can be transmitted by more than one species of tsetse fly; this means that the development undergone by the trypanosome in the body of its insect host, may proceed in more than one variety of tsetse fly. Only those trypanosomes ingested at a suitable stage of their development will continue to develop within a tsetse fly. Development within the fly can not take place unless the temperature of the air is above 20°C; this is probably the reason why sleeping sickness does not spread in cool highlands where tsetse flies exist. The nature of the development undergone by the trypanosome within the tsetse fly has not been entirely elucidated. There seem to be two types of development. In one, trypanosomes capable of producing an infection, multiply in the proboscis. In another, trypanosomes multiply in the gut, and then go to lie in the salivary glands; thence they probably go out to produce an infection when the fly feeds upon a susceptible animal. There is some ground for believing that the development of trypanosomes proceeds best in flies which do not feed upon blood after that feed at which they became infected. It has long been known that wild animals of Africa—big game—are often

infected, without obvious symptoms, by trypanosomes, which will produce fatal disease when inoculated into domestic animals. It has only recently been shown that antelopes and other animals may also be infected with trypanosomes indistinguishable from those which cause at least one form of human trypanosomiasis in Africa. In the same way animals have been shown to be a host of a trypanosome of a different type, which is the cause of a fatal human disease in South America. No specific treatment is known by which trypanosomes can be destroyed with certainty. Neither is there any means of killing the insects which transmit the trypanosomes, as mosquitoes can be killed; therefore, in trypanosomiasis, it is doubly necessary to attack the parasite through its hosts. If the animals which harbour trypanosomes and constitute a reservoir, from which tsetse flies can derive infection, were destroyed, much would be done towards controlling the progress of trypanosomiasis. It has been shown that some trypanosomes may be transmitted mechanically by several flies, through infected blood remaining on their biting parts, if, when driven off from an infected animal, they quickly fly to an uninfected one to resume feeding; it is possible that some instances, in which all those inhabiting a hut are infected, may be explained by such a mechanical transmission of trypanosomes through the bites of mosquitoes. Trypanosomes of the rat can be transmitted from rat to rat by the bites of the rat flea. The infection may be also transmitted by an entirely different process. A non-flagellate stage of the trypanosome is excreted with the faeces of the flea. If faeces containing this stage be ingested by a rat it become infected; so far as is known, none of the pathogenic trypanosomes are transmitted in this way. Trypanosomes recently found in hens, are transmitted by the bites of a small black fly, one of the *Simulidæ*.

Attempts to find a specific for the treatment of trypanosomiasis continue. Compounds of antimony have been shown to be as trypanocidal as are those of arsenic; for example, atoxyl and its derivatives. A most interesting outcome of this work has been to show that some drugs are capable of acting directly upon individual parts of trypanosomes, and so it has been possible to create, by drug treatment, a race of trypanosomes which lacks a kinetonucleus.

Very little is known concerning the nature of the immunity which exists in many protozoan diseases. The observation that an immunity to *Trypanosoma lewisi*, the rat trypanosome, can be produced, in rats, by the inoculation of old cultures which have become avirulent, is an interesting one.

New methods by which trypanosomes, and other protozoan parasites, can be stained in sections, have been elaborated. Already, by their use, much has been learned concerning the tissues which are most affected by these parasites. One of the most constant changes is a proliferation of the endothelial cells. The liberation into the circulation of such cells is probably at least one of the causes which leads to the increase in the number of large mononuclear cells in the blood of patients suffering from protozoan infections.

Two very important diseases are caused by parasites, which are classified with the herpetomonads, another genus of the flagellata. *Leishmania* (or *Herpetomonas*) *donovani*, is the cause of a fatal disease characterized by progressive emaciation, splenic enlargement, and chronic fever. This disease, first called dum-dum fever or kala-azar, has been shown, under the name of tropical splenomegaly or infantile kala-azar, to occur in all the countries bordering on the Mediterranean, throughout Asia, and occasionally in South America. The other disease, caused by *Leishmania* (or *Herpetomonas*) *furunculosa*, is characterized by a superficial, painless swelling, which usually ulcerates; it is known by many names, Delhi boil is one of the commonest. It has been shown that these ulcers may occur on mucous membranes as well as on cutaneous surfaces. This form of leishmaniasis has the same distribution as the other and, in addition, seems to occur throughout Central and Southern America.

About the Mediterranean, dogs and cats have been found to be infected with a parasite which produces similar symptoms, and in appearance is identical with that which is found in cases of infantile kala-azar. The infection can be transmitted from dog to dog by means of fleas. The suggestion that human beings acquire the infection in the same way is a pertinent one. In India experiments have been made which tend to show that kala-azar may be transmitted by the bites of bedbugs; but the development normally undergone by the parasite within the bedbug will not proceed if the bugs have a second feed of blood after the infecting one. No means of curing kala-azar is known, although recovery has been reported in one instance, a case treated by salvarsan.

Spirochætes and treponemas constitute very important classes of the flagellata. By far the most important advance in our knowledge of diseases caused by spirochætes, is that they are all amenable to treatment by salvarsan. Neosalvarsan seems to be even more spirochæticidal than salvarsan, and to be better tolerated by the

patient. This discovery means that diseases, such as the relapsing fevers—which are transmitted by ticks, or through lice,—yaws, and various ulcers, can be cured within a few hours by one, or at the most, two injections. Antimony has also been shown to be of service in the treatment of yaws. New spirochætes have been described in the intestines of fish and in the blood of guinea pigs. That the bite of any insect may be a potential source of danger is suggested by experiments in which spirochætes have been mechanically transmitted by the bites of the common stable fly, a fly which is able to transmit infantile paralysis. An interesting point, which may prove to be of value in experiments designed to ascertain in what form the spirochæte is transmitted by ticks, is that the sensory organs by which *Ornithodoros* ascertains whether material is fit for food, are placed at the tips of its first pair of legs. If these legs be amputated the ticks can be made to feed upon anything.

The sporozoa are a large and rather heterogeneous assemblage. Among the most important of them are the *Hæmosporidia*, which includes amongst its members the parasites of malaria. A simple method of cultivating malarial parasites, which is applicable to other intracellular blood-parasites, has been devised. It depends upon the addition of a small amount of dextrose to the blood. Parasites will multiply, especially near the surface of blood so treated, when it is kept at blood temperature. By means of this method it has been possible to study little-known stages in the development of the malarial parasite, and an observation made on cultures of the *æstivo-autumnal* parasite has suggested a reason for the blockings of capillaries, and the consequent serious lesions, which are most prone to occur in infections by that parasite. The adult asexual forms seem to be sticky, and they tend to clump together. It has been suggested that through this tendency these parasites may be caught in the capillaries. Malarial parasites, very similar in appearance to those affecting man, were formerly thought to be harmless parasites of monkeys. It has been shown that they, like the newly-discovered parasite of antelopes, may cause serious illnesses accompanied by fever in their animal hosts. The illness in the case of the monkeys may even be fatal, and be accompanied by hæmoglobinuria and other lesions similar to those observed in malaria.

The mechanism of the relapses, which may occur some years after a patient has been apparently cured of malaria, has always been much discussed. Many reasons have been brought forward

to support the opinion, now generally accepted, that such relapses are to be explained by the persistence of asexual parasites in apparently cured persons, in numbers insufficient to cause symptoms, and too small for the parasites to be detected, except by a most searching and sustained examination. The relapse, with its rapid multiplication of parasites and the production of symptoms, often depends for its initiation upon the intervention of some cause, such as "lowered resistance," in the host which favours the development of the parasites.

Experience, derived from the treatment of malaria among those engaged in the construction of the Panama Canal, has added support to a generalization suggested by the results of the experimental treatment of trypanosome infections. It was shown there that the best method of treating trypanosomiasis was with full doses, given as frequently and as early in the course of the infection as possible. In the Canal Zone the rule is to give not less than forty-five grains of quinine a day, in doses of fifteen grains each. It is found that doses less than these have a tendency to produce quinine-resistant strains of malarial parasites, which become exceedingly difficult to eradicate. It was natural that numerous attempts should be made to treat malaria by salvarsan, and it is disappointing that this drug has turned out to be of value only in the treatment of the benign tertian form of malaria.

That small parasites may have lesser ones "upon their backs to bite them," has again been shown by the discovery of a small biting fly which sucks blood from the distended abdomens of recently fed mosquitoes!

The *Babesia* include an important group of parasites, which cause the "red water" of cattle and of other animals. It has been shown that a drug, trypan blue, elaborated during attempts to find a cure for trypanosomiasis, has a very curative action in diseases due to some of the babesias. The babesias may be cultivated in the same way as the malarial parasites. There is a member of this group which is especially interesting, because of its extremely small size. In stained preparations, it appears as a small dot of chromatin, usually lying near the periphery of a red cell. It apparently has no cytoplasm. This parasite has been found to be transmitted, like many of the other babesias, by ticks.

The knowledge that dysentery might be caused through infection by *Trichomonas*, a flagellate, and *Balantidium*, an infusorian, has received additional confirmation from several parts of the world during the past year.

One or two new parasites, causing serious and fatal infections, must be placed among the protozoa of uncertain situation; here also are placed those diseases caused by filterable and by unknown viruses. Papatassi, phlebotomus, or sand-fly fever, is being shown to have a much wider distribution than was suspected when it was first described in Southern Austria. It exists in many places about the Mediterranean basin. Although much has been learned concerning the bionomics of the fly which transmits this disease, nothing has been discovered which promises to be of practical importance in its prevention.

Although several new species of worms, parasitic in man, have been described, one of the most important advances in our knowledge of verminous infections has been the proof that *Filaria diurna* is the embryo form of *Filaria loa*, and that *Filaria nocturna* is the embryo form of *Filaria bancrofti*. It has been shown that an infection by the latter filaria is, through blocking of lymph channels and through the lesions that may be produced in lymph glands, quite sufficient in itself to cause elephantiasis. Nevertheless it is certain that in many cases of elephantiasis a large part of the œdematous and fibrotic changes is due to a chronic, localized, streptococcal infection.

As is usual, much work has been done on the description, classification and bionomics of all of the injurious insects. One of the most interesting pieces of work has been done upon *Auchmeromyia luteola*. The larva of this fly—a grub—has the blood-sucking habits of the bedbug. It has been shown that other closely-related flies have exactly the same habits, and that in each species, the female fly deposits the eggs, which are to become larvæ, in localities where the larvæ will have an opportunity of feeding upon their especial host when they are hatched.

JOHN L. TODD.

THE private patients' pavilion of the Toronto General Hospital was opened January 6th. The building is complete in itself and is intended to accommodate one hundred and fifty patients. It is provided with its own operating rooms, an x-ray room, and its own separate staff and nurses, and throughout is most beautifully equipped.

German Literature

ABSTRACTS OF GERMAN LITERATURE

ERYTHEMA NODOSUM AND TUBERCULOSIS. BY PROFESSOR E. MORO, of Heidelberg. *Muenchener Medizinische Wochenschrift*, No. 21.

THE author, Professor Moro, wishes to take exception to the statement made by Pollak in the *Wiener Medizinische Wochenschrift* to the effect that erythema nodosum occurs, certainly in childhood, in tuberculous individuals exclusively, and is, indeed, a tuberculous skin lesion, the statement being based on the fact that forty-eight children with this condition, examined in the Vienna Poliklinik, gave without exception a positive cutaneous reaction to tuberculin: and this, moreover, at an age when tuberculosis is relatively rare. Moro's investigations have resulted in five negative reactions in forty-eight cases of erythema nodosum, and he claims that Pollak's figures merely remind one of the frequency with which tuberculosis attacks Viennese children. The author does not deny that erythema nodosum and tuberculosis may bear some relation to each other, for he reminds us that he was the first to investigate this question and has published the report of an instance where a child with tuberculous spondylitis was given the tuberculin test with the result that there appeared on the legs petechial and purpuric spots, many of which assumed the appearance of erythema nodosum. There seems to be no doubt of the tuberculotoxic nature of the above condition. On the other hand the inoculation of guinea pigs with material obtained from an excised nodule has always been negative. One cannot then say that the nodules are tuberculous lesions, indeed their appearance cannot always be considered as due to the existence of a tuberculous *allergie** in the tissues, as one might be inclined to believe. But it is known that children suffering from erythema nodosum frequently have purpura and exhibit a marked vasomotor excitability to chemical irritation which alone could explain the intensive cutaneous tuberculin reaction.

*Allergie: von Pirquet's term for a condition of acquired immunity associated with the phenomena of anaphylaxis. Translator.

HYPERTROPHY OF THE PROSTATE. BY PRIVATDOZENT KIEL-
LEUTHNER, of Munich. *Muenchener Medizinische Woch-
enschrift*, No. 31.

The author thinks we must consider hypertrophy of the prostate as a proliferative neoplastic process; as a new growth from the gland epithelium, characterized by large or small retention cysts; but of its immediate cause we are as ignorant as that of other tumours. There has been a decided change in the teaching regarding the rationale of operative treatment for this condition. Until a short time ago surgeons were of the opinion that by the suprapubic route they could remove the whole prostate; even Freyer was of the opinion that he was practising total extirpation of the gland. It seems astonishing, with one's knowledge of the anatomy of the prostate, that it should have been believed that with the finger, one could remove in a few minutes an organ that has no true capsule, and is very closely attached to the surrounding tissues. Latterly Tandler and Zuckerkandl of Vienna have taught that one only succeeds in partially shelling out the gland; that this must be so if the sexual function is retained. The so-called middle lobe and the lateral lobes which spread out from it and encircle the urethra above the verumontanum are the parts that hypertrophy. Certain French surgeons have gone so far as to say that the hypertrophy is of accessory prostate glands, and not of the organ itself. If the whole gland were enlarged the prostatic urethra would be lengthened, which is not the case. The fact that the extirpated lobes often have the appearance of the complete prostate is frequently misleading. In a properly performed operation the sexual potency is retained, since it is only the part of the urethra which is above the verumontanum that is occasionally removed with the hypertrophied parts of the gland. The perineal route causes more danger to the ejaculatory ducts than the suprapubic. Again one must consider the great danger to which the patient would be exposed from hæmorrhage from the prostatic plexus and from extravasation, if the whole gland were actually removed. In summing up one may say: that there are parts of the prostate that rarely hypertrophy; that with the modern operation the prostate remains; and that the method, although a conservative one, results usually in a permanent cure.

SERUM THAT WILL NOT CAUSE ANAPHYLAXIS. BY DR. WILHELM EICHHOLZ. *Muenchener Medizinische Wochenschrift.*

The ordinary form of dried serum, in spite of many advantages, especially for use in the tropics, cannot be recommended, since it is difficult and sometimes impossible to redissolve it in sterile water. The author has experimented with a new method of preparing a dried serum with excellent results. The ordinary immune serum is dried at a low temperature under aseptic precautions and the dried product ground to a fine powder which is suspended in sterile olive oil. The result is an oily solution that is sufficiently fluid at room and body temperature and can be injected by means of the ordinary syringe. The solution contains no preserving fluid, but by means of its absolute freedom from water there is no danger of deterioration or bacterial pollution, for bacteria do not multiply in this medium. It has moreover another distinct advantage: it does not produce anaphylaxis. Our knowledge of albumen anaphylaxis leads us to believe that after the sensitizing injection there are formed in the organism specific proteolytic ferments which, after a second injection at a later period, cause a rapid splitting up of the injected albumenoids, and as a result a flooding of the system with toxic albumenous products. The dried serum does not produce any of these results, and this was proved thus: a number of guinea pigs were injected subcutaneously with horse serum and after twenty-one days some of these were again injected with this serum, while the remainder were given the specially prepared dried product of the serum. The severity of the anaphylaxis produced was gauged chiefly by the drop of body temperature. The animals that received the reinjection of fluid serum exhibited a fall of temperature averaging 5° C. Four of these animals were very ill. In the case of the guinea pigs that received the dried serum there was scarcely any reaction, the average fall of temperature being 1.4° C., and none of them showed any signs of sickness. The efficiency of the dried serum as an antitoxin is proved satisfactorily by various experiments, but the tables showing the results are too long to reproduce in these columns. The antitoxic action is not so rapidly apparent as with the ordinary serum; but it is better, for instance in a case of diphtheria, to have a delay of perhaps an hour in the effects of the dried serum than to subject the patient to the danger of anaphylactic shock from the ordinary fluid preparations.

London, Ontario.

G. C. HALE.

Obituary

DR. ROBERT C. YOUNG, of Detroit, died November 23rd. Dr. Young was born in Wentworth County, Ontario, July 29th, 1850. He was educated in Hamilton and took his medical training at McGill University, graduating in 1873. He then spent several months as house physician in the Hamilton Hospital, after which he took up a practice in Ridgetown. In 1909 he left Ridgetown and went to Detroit, where he practised until the time of his death. Dr. Young leaves a widow and one son, Mr. Clinton Young, of Chicago.

DR. C. A. DUGAS, of Montreal, died January 7th, in the fiftieth year of his age. Dr. Dugas was born in St. Jacques l'Achigan, Que., and was educated at St. Mary's College, Montreal. He graduated from Victoria University in 1887. Dr. Dugas was well known in Montreal, and for the past twenty years had held the position of coroner's physician.

DR. JAMES D. BALFOUR, of London, Ontario, died of pneumonia January 7th, in the fifty-eighth year of his age. Dr. Balfour was born near Mitchell in the county of Perth, Ontario. Before taking up the profession of medicine he taught for some years. He then entered the Western Medical School and took his M.D. degree in 1887. After practising for a short time in London, Ontario, he took a post-graduate course in the University of Edinburgh. On his return to London, Dr. Balfour became medical superintendent of Victoria Hospital, a position he held for fourteen years, retiring in March, 1902. Since then he has occupied the post of lecturer on the staff of his Alma Mater. He was also an examiner on the Ontario Medical Council and medical director of the Northern Life Insurance Company. In his death, the profession has lost one of its most able and devoted members. In his younger days Dr. Balfour was a distinguished athlete. Dr. Balfour leaves a wife, three sons, and one daughter.

News

MARITIME PROVINCES

THE prize for the most efficient clearing hospital in the Canadian Militia has been awarded to No. 2 clearing hospital, of which Major F. S. Ford is the commanding officer. This unit was trained at Sussex, New Brunswick, in June, 1913.

THE plans are in progress for a tuberculosis hospital at St. John, New Brunswick.

A SURVEY is to be made of certain sections of St. John, New Brunswick, to determine the conditions of housing and sanitation with a view to their improvement; and, if deemed advisable, the legislature will be requested to take up the matter and to assist the health authorities in their efforts to promote sanitation.

THE Halifax Medical Society recently passed a resolution in favour of the establishment of a sanitarium for tuberculosis, to be erected by the city. A second resolution was also passed in favour of frequent chemical and bacteriological examinations of the water of the city. The resolutions were referred to the board of health. It is estimated that the cost of the proposed sanitarium would be about five thousand dollars a year, that is on the basis of a weekly cost of twelve dollars for each patient.

THE plans are being prepared for a hospital at River Glade, New Brunswick. The proposed building will accommodate one hundred patients and will cost about fifteen thousand dollars.

MR. J. F. McMURRAY has been elected president of the Victoria Public Hospital at Fredericton. During the month of December forty-two patients were treated in the hospital and two deaths occurred.

A MEETING of the board of health took place at Fredericton, January 6th. Among other matters, the payment of one dollar a week for each pauper in the provincial hospital for the insane, at

Fairville, came up for discussion. According to legislation passed last session, this sum must be paid by the municipality to which the person belongs, the law to come into force from January 1st of the present year. The act met with a certain amount of criticism, as it was considered by some members of the board that this expense should not be borne by the public. The patients in the asylum now number thirty-four, and the institution is already somewhat overcrowded.

ONTARIO

DR. McCULLOUGH recently drew attention to the prevalence of typhoid in the neighbourhood of Windsor. He attributed the increase in the number of cases to the poor water supply.

THE children's hospital at Hamilton is almost completed.

A HOUSE with six and a half acres of land has been purchased at Brantford and will be used as a smallpox hospital. The former building was quite out of date and had been partially burnt down.

A DEPUTATION from the Hamilton Health Association waited upon the board of control, October 22nd, with the request that \$75,000 be granted for the purpose of building and equipping a new infirmary. The present building was given by Colonel Grafton and was intended to accommodate eight persons, whereas at the present time twenty-two patients are there. It is now necessary, in order to continue to receive the government grant, to erect a new building with accommodation for from seventy-five to one hundred patients, and this the Association is unable to do unless assisted financially by the city council.

AT the recent municipal elections the Hamilton Hospital by-law was passed by a majority of about fifty votes. Arrangements will be made accordingly to build a hospital on the site which already has been purchased on the mountain.

DURING the past year, under the able supervision of Dr. C. J. Hastings, the medical officer of health, a great deal has been done to improve conditions in Toronto in so far as the public health is concerned. The city has been divided into eighteen sanitary districts, each in charge of an inspector. The number of cases

of typhoid fever, diphtheria, and scarlet fever has been less than it was two years ago, in spite of the increasing population. The deaths attributed to these causes during the first eleven months of 1912-13 were, typhoid fever, 101; diphtheria, 221; scarlet fever, 98.

The by-law to grant \$250,000 to a hospital to be established in the east end of Toronto was defeated on January 1st.

THE Indian village of Wickewimiking, on Manitoulin Island, is quarantined on account of smallpox. The population of the village is over fourteen hundred.

At a meeting of the Hamilton board of health, on January 14th, application was made by a citizen for compensation. The applicant claimed that he had been obliged to discontinue his work because his child had contracted smallpox, and the family had been quarantined. The claim was rejected unanimously by the board on the grounds that the child had never been vaccinated.

THE report of the work accomplished during the past year by the district nurses in Peterborough shows that 174 patients were attended, and 2,745 visits were paid. The cases are classified as, general medical cases, 77; tuberculosis cases, 52; including 36 cases of pulmonary tuberculosis; surgical cases, 30; obstetrical cases, 15.

QUEBEC

THE following cases of contagious disease were reported in Montreal during the week ending December 13th. Diphtheria, 51; scarlet fever, 54; typhoid, 1; measles, 10; chicken-pox, 28; tuberculosis, 31. There were 240 births, and 168 deaths, 66 of which were children under five years of age.

THE Quebec Medical Society, gave its annual dinner at Kent House on Saturday evening, December 13th. Dr. E. M. A. Savard presided.

AN outbreak of scarlet fever is reported from Dunham.

MANITOBA

THE by-law for a grant of \$265,000 to the Winnipeg General Hospital was defeated for the second time on December 12th. It was submitted first in October, when the number of votes registered was 1,539 in favour of the grant and 1,405 against it. As the total number of votes was so small, the by-law was submitted a second time with the result that 3,070 voted in its favour and 3,097 voted against it.

AN outbreak of smallpox is reported in the neighbourhood of Goodlands, south of Deloraine, and in the district surrounding Napinka.

ALBERTA

A MUNICIPAL abattoir is to be erected at Calgary, at a cost of one hundred and twenty-five thousand dollars.

DR. A. BRAITHWAITE, of Edmonton, has been appointed to the Medical Council of Canada in place of the late Dr. G. A. Kennedy, of Macleod.

SASKATCHEWAN

AN outbreak of smallpox is reported among the Indians at Piapot's Reserve, north of Regina. It seems probable that the disease has existed there for some time.

REV. EDWARD HERBERT GRAY, M.D., has been appointed superintendent of the Waddell Memorial Hospital which was recently erected at Canora.

AT a meeting of the Saskatchewan College of Physicians and Surgeons held at Regina, December 30th, it was announced the following had successfully passed in all their subjects at the last examination: W. D. Brace, C. Coulter, C. H. Edmunds, W. H. Godfrey, O. M. Irwin, W. C. Kitchen, J. C. Kittlesey, R. M. Laroye, W. H. Mains, J. M. McLean, J. R. Pare, H. J. Robertson, E. A. Shaw, A. Lousy, F. J. Thompson, J. A. Murison, R. M.

Johnstone, J. L. A. Acrogy, and O. N. Singleton. Stars were granted to M. H. W. Fizzel, E. A. Richardson and J. A. O'Brien.

THE annual meeting of the Saskatchewan Medical Association this year will be held at Saskatoon during the month of June.

IT is reported that the provincial medical library, if ultimately established, will be placed in the university buildings at Saskatoon, instead of at Regina, as was suggested at first.

THE establishment of a municipal abattoir at Regina is under consideration. A resolution urging its establishment was forwarded recently to the city council by the Retail Merchants' Association.

THE plans are being prepared for a nurses' home in connexion with the Regina General Hospital.

At a recent meeting of the council of the rural municipalities of Rosthern, a discussion arose as to the advisability of continuing the grant of \$900, which was made last year to the maintenance fund of the Alexandra Hospital. At the recent elections, a by-law in aid of the hospital was defeated. It was decided to grant the sum of \$75 to the hospital for the month of January, and, in the meantime, to consult the wishes of the ratepayers in the matter.

BRITISH COLUMBIA

THE contract has been let for the new administration building and the nurses' home of the Vancouver General Hospital. So far as possible, material of Canadian manufacture only will be used in the construction of these buildings. The treasurer's statement for the month of November showed a deficit of \$2,500, and in order to remedy this, it has been decided to increase the fees charged for semi-private wards from \$1.75 to \$2, a day, and those for private wards from \$2.00 to \$3.50 a day.

A BY-LAW is to be submitted to the ratepayers of Nelson to grant \$20,000 towards the construction of the new Kootenay Lake General Hospital. It is proposed to commence the building next spring. A request will also be made to the legislature next session for a grant of \$50,000. A couple of years ago a civic grant of

\$15,000 was made and an equal amount subscribed. Thus \$30,000 was available for the new hospital and this amount the provincial government doubled, so that there is now on hand \$60,000. Some delay has occurred in the erection of the hospital, but it is hoped that a hospital will now be built large enough to meet the requirements of the city, due allowance being made for its growth.

A BY-LAW to grant \$15,000 to the Royal Inland Hospital has been introduced by the Kamloops city council.

ARRANGEMENTS are being made to add a building for advanced cases of tuberculosis to the sanitarium at Kamloops. The sum of \$75,000 is already in hand, and the provincial government will be asked next session to contribute a further \$75,000. It is hoped that the building will be completed by the early autumn, as the present accommodation at the sanitarium is overtaxed.

It is probable that, during the next session of the legislature, bills will be introduced to regulate the milk supply and to improve sanitation, especially in so far as new buildings are concerned, throughout the province.

Canadian Literature

ORIGINAL CONTRIBUTIONS

The Public Health Journal, December, 1913:

Immigration and its effects upon the public health	P. H. Bryce.
Preventive medicine and the family doctor	A. H. Wright.
The relation of the health officer to the community	M. R. Bow.
School Buildings	J. H. Puntin.
Heating and ventilating modern school buildings	S. S. Kennedy.

Dominion Medical Monthly, January, 1914:

Venereal diseases	J. S. Sprague.
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The Canadian Journal of Medicine and Surgery, January, 1914:

- The necessity for the routine examination
of the nose and throat J. P. Sproule.
Personal impressions of the seventeenth
International Congress of Medicine. C. Starr.

The Canadian Practitioner and Review, January, 1914:

- Foreign bodies in the air passages . Sir Rickman Godlee.
The harbour of indifference, an allegory . G. D. Porter.
Isolation hospital, planning and manage-
ment T. H. Whitelaw.
The backward child W. E. Struthers.

The Western Medical News, December, 1913:

- A few hurried notes regarding beri-beri G. R. Peterson and
J. P. Des Rosiers.

Le Bulletin Médical de Québec, January, 1913:

- Transplantation cartilagineuse dans un
cas de difformité du nez . . . J. Vaillancourt.
Obstruction intestinale par étranglement
et hernie internes—paparotomie. . G. A. Paquet.

Medical Societies

TORONTO ACADEMY OF MEDICINE

At the monthly general meeting of the Toronto Academy of Medicine, December 2nd, 1913, Dr. Oskar Klotz, professor of pathology and bacteriology in the University of Pittsburgh, delivered an address on "The Triple Alliance, Heart, Kidney and Arterial Disease." (See page 85.)

The discussion following the reading of this paper was opened by Professor A. McPhedran. Dr. McPhedran drew attention to the very great interest of the subject matter, the view that these hypertrophies are really the result of inflammations. He pointed

out that arteriosclerosis and high blood pressure are synonymous and that these pathological conditions do not go hand in hand.

Dr. McPhedran then moved a vote of thanks to Dr. Klotz for his kindness in coming to Toronto, and addressing the Fellows of the Academy on matter so full of interest.

Dr. Henderson said that Dr. Klotz had presented in a very clear manner a conception which would be of great advantage to all in future work, and referred to the main theme of the paper as one of very great interest. He would not attach too much weight to the increased viscosity of the blood in hypertension of kidney disease; he thought there might be a misconception by members of the Academy as to Dr. Klotz's view in regard to the two distinct types of nephritis, namely the type secondary to arterial disease and based on hypertension—the type arising as a result of absorption of autogenic material or possibly increased secretion of adrenalin and associated with worry and strain, and, secondly, the type coming on as a result of primary infection. It was important to remember that there are these two types of kidney disease, and Dr. Klotz, by his exposition of the subject and his very excellent drawings, had given conclusive evidence of the existence of the latter type as well as of the former.

In seconding the vote of thanks, Dr. Henderson, said that all had enjoyed the paper very much indeed and would profit by it, and each member would be able to go about his clinical and surgical work with a fuller and somewhat different conception of this subject.

Dr. R. J. Dwyer said that Dr. Klotz did well in calling attention to the fact that in cases of rheumatism, clinicians should not overlook the possibility of inflammation of organs other than the heart and the joints. The physician may often overlook whole series of lesions involving the circulatory system. He wished to ask whether there was clinical evidence whereby these special acute inflammatory conditions could be detected before death. He also asked whether there was early evidence to show that an attack of acute inflammatory disease in childhood would be followed later in life by a cardiac renal lesion.

Dr. William Goldie said the discussion of this subject was of more than ordinary interest in that the idea now held would be crystalized. He referred to infection and its localization, and said there was an analogy to that in nearly all infectious diseases. He mentioned typhoid fever as an example—a disease that follows for a certain number of days a definite course without any extraoridin-

ary happenings, after this comes a period in which agglutinins and various other antibodies are formed. Evidence of this is seen in the rose spots and also in various outbreaks in the body of local inflammations, as meningeal disturbances and inflammations in other organs, these localizations being afterwards confirmed at post-mortem, for example in the liver, heart, blood vessels, kidneys and throughout the body. These are acute and, as a rule, rapidly passed over rarely leaving evidence of their presence, except sometimes in some of the grosser vascular changes. In the more chronic and less irrelative type such as Dr. Klotz had taken up, it is very hard for the clinician to associate the picture laid before the members with the clinical picture. All know that in these infectious diseases the kidney may show some disturbance, but not often is more made out clinically than to find traces of albumen and sometimes some desquamation, sometimes casts and sometimes evidence of a more marked disturbance. It is well to remember the point raised, that one infection leaves but little trace, whereas recurrent infections bring about serious results showing the necessity of recognizing and treating such infections in childhood in order that the recurrent infections and final atrophic changes may be prevented. He was glad to note that Dr. Klotz did not use the term "itis" very often in referring to the later changes that occurred. He kept fairly to the words "acute inflammatory." Dr. Goldie did not know any term that clinicians used so loosely as "itis," in such words as nephritis, myocarditis, etc. In post-mortem work the diagnosis resolved itself practically into myocarditis and chronic myocarditis. These examinations merely show the scar tissue that is left.

Dr. H. B. Anderson said it occurred to him that Dr. Klotz's conception of the relation between cardiac, renal, and vascular conditions differed from that ordinarily held. He furnished a factor which correlated the disease in these three different conditions and this factor was the infection. He understood from Dr. Klotz's paper that the infection mentioned served as a type of the condition which would give rise to these pathological processes simultaneously in the three different tissues mentioned. This differed from the usual idea that the condition in the heart was secondary to that in the kidney or the arterial condition secondary to the rise in blood pressure. He did not gather from the doctor's paper that he excluded the mechanical factors of increased blood pressure when such was present but rather asserted that this is not a necessary part of what is ordinarily spoken of as arteriosclerosis. He did not mention the influence that various intoxi-

cations (such as were referred to by Dr. Henderson) might have, for example nicotine, adrenalin, or the factors of overwork, worry and nervous strain. Another point that occurred to him was that referred to by Dr. Dwyer, namely, and that in rheumatic infections as seen afterwards at the autopsies the clinical picture presented was not that of arteriosclerosis as ordinarily seen. From the description of the pathological process as given by Dr. Klotz the lesions were more of a focal nature in the different organs, particularly the kidneys or heart; he did not remember whether he mentioned also the blood pressure.

Dr. Duncan Graham asked Dr. Klotz whether he considered the streptococcus viridans the cause of rheumatism, secondly, whether so-called Aschoff bodies are specific for acute rheumatism? Is it to be understood from Dr. Klotz's experimental work that he found Aschoff bodies in the heart lesions after injections of the streptococcus viridans? Finally had Dr. Klotz examined any joints in animals that had been injected with any of the varieties of the streptococcus?

Dr. George Ross said there were one or two especially interesting points brought out in this paper, first the association of certain streptococci with the production of virus causing vascular inflammation. He had shown that the streptococcus viridans, and others of that group, were closely associated and that these organisms call forth the overproduction of fibrous tissue. In the chronic arthritides, such as rheumatoid arthritis and osteo-arthritis, there is a production of fibrous tissue and these conditions are believed by many to be the result of continued irritation kept up by infections of certain parts of the body by organisms of the streptococcus viridans type. He would like to ask whether the members of this group of organisms may not all have a selective affinity for fibrous tissue. An interesting point made was that one dose of poison that called forth a non-suppurative inflammation was not sufficient to cause damage, and therefore many repeated doses were required to produce mischief. It is known that streptococcus viridans is a cause of chronic alveolar abscess in pyorrhœa, might that not be an important factor resulting in repeated infection of the blood stream and bringing about perivascular inflammation such as so often arises in heart, blood vessels, and kidneys?

Dr. Hunter asked for information as to the relationship of chronic suppurative processes in the ear and various sinuses of the face, with conditions such as Dr. Klotz had mentioned.

Dr. Paul Scott continuing the discussion recalled the state-

ment of Sir James Paget that nothing could be considered true which could not be proved clinically, and what could be demonstrated clinically required no further demonstration. He referred to a case that had come under his notice in which long continued infection, in a patient of forty-two years of age, had resulted in definite evidence of the three conditions, arteriosclerosis, hypertrophy of the heart, and sclerosis of the kidney. Ten years ago the woman, aged thirty-two, had mitral stenosis with the usual symptoms, resulting in lack of compensation. She was treated by rest and digitalis with no improvement. Later she developed a malignant endocarditis. In connexion with this endocarditis she had two or three septic infarctions of the kidneys. Dr. McPhedran saw the case, and had no doubt in regard to the prognosis, a fatal termination. She did not die, however, and after the recovery the mitral condition gave very little trouble. It seemed to Dr. Scott that the severe inflammation had resulted in relief to the mitral valve. After that she was able to do her own housework, became married again and is once more a widow. For upwards of ten years after this illness, the patient was comparatively strong and healthy. She is now forty-three years of age and is failing in health again, blood pressure 175, heart extended two finger breadths outside the nipple line. The quantity of urine passed daily is large, with low specific gravity, and there is abundance of albumen present, also casts. Of late she has developed symptoms of uræmia, and once has had a uræmic convulsion. The evidence is clear that long continued infection was followed by the condition described by Dr. Klotz. He asked whether there are early symptoms whereby an infection such as was present in this case could be recognized clinically, that one might suspect such a condition of infection apart from the acute rheumatic attacks.

Professor McPhedran corroborated Dr. Scott's report of this case. He asked whether Dr. Klotz would account for localization of arteriosclerosis by infective processes in all cases. Dr. McPhedran recently saw a man of seventy years of age with a blood pressure of 180. This pressure was due to spasm. The pressure was but temporary as it became low again. The man is suffering from cardiosclerosis, and there is no evidence of disease of the kidneys. Some of his arteries are quite thickened but his whole arterial system is not in this condition.

In closing the discussion Dr. Klotz said he would have to apologize for starting over again. He felt when he started into the subject that it would be very difficult to attempt to cover the field of

these three organs in the course of an evening's discussion. That was one reason why he wished not to be misunderstood as dealing with heart disease, kidney disease, or arteriosclerosis, but rather as dealing with the triple alliance, the three diseases occurring together. It had been his wish merely to show a correlation between the factors that bring about common lesions in the three organs, heart, kidneys, and arteries. He had not dealt with kidney disease of the tubular type, with that type where the tubules were destroyed by auto-intoxication or by various drugs and absorptions from the intestinal tract, or by other varieties of conditions named in the text-books. In regard to the point of auto-intoxication brought up by Dr. Henderson he did not wish to discount the fact of various agents striking the kidney and possibly affecting the arteries, but which were not definitely related as factors in the triple alliance. He therefore would not go into the various types of kidney disease brought up but would confine his reply to the subject under discussion. Replying to Dr. Dwyer's statement that the speaker had not brought out his attitude to the so-called rheumatic fever and the allied form spoken of sometimes as muscular rheumatism and his question whether acute articular or acute rheumatic fever left any marks upon the organ so that at autopsies the findings would show that such had occurred in early life, Dr. Klotz said acute rheumatic fever leaves its marks, and that these can be seen at the autopsy. In this the pathologist might be wrong in some cases, but right in the majority. Last year he had searched at autopsies for such lesions in acute rheumatic fever and allied diseases, and had found these marks on the structural tissues of the heart, particularly on that tissue associated with nutrition. Investigating this matter further he found that in the majority of these cases there were marks on the ascending aorta, also in the arch, less frequently on the descending aorta and still less frequently on the abdominal aorta; but they were not commonly present in the branching arteries to the visera.

Dr. Goldie made a point which Dr. Klotz had desired to bring out his original remarks, namely, that lesions in the different systems are found at autopsies and yet no clinical findings corresponding to these had been noted in the history of these cases. Some of these manifestations might have been noted if attention had been directed more closely toward them, but in the ordinary course, attention is directed to the more actively diseased organ, the lesser clinical manifestations thereby escaping notice. Not uncommonly in kidney disease in its early stage the inflammatory process is

slight and clinical manifestations are wanting, or else so slight that they are unnoticed and yet this is the beginning of a progression to more serious trouble. With regard to recurrence every one is struck with the fact that this type of infection is apt to recur; there is no immunity produced from a single attack and it would seem that resistance becomes actually less. With regard to the mechanical factors that may influence the ultimate results, he said that when the process becomes established, if nutrition allows it, the heart will hypertrophy.

In reply to Dr. Anderson, Dr. Klotz had found that in diseases of the triple alliance an examination of the heart muscle did not show an increase of muscular tissue, similar in quality to that of the natural organ. There was in addition to the hypertrophy evidence of disease—a diseased process similar to sclerosis. Regarding auto-intoxication, nicotine poisoning, etc., as brought up by Dr. Anderson, he said this was another story entirely. With certain drugs arterial disease can be induced with the sequelæ such as increased blood pressure and hypertrophy of the heart, for example the administration of adrenalin will so result.

The local distribution of arteriosclerosis brought up the big problem as to the reason for such distribution. This might be studied by itself, and arteriosclerosis in one particular system has its own cause for its presence there. An arteriosclerosis of the right arm more than in the left arm, is commonly found in right handed persons. This is induced by the greater amount done by that arm. Recently there had occurred a case of unilateral arteriosclerosis of the pulmonary system in which one lung was completely collapsed and functionless and free from sclerosis, whereas the other lung was extremely sclerotic.

In reference to Dr. Graham's question as to the association of streptococcus viridans with acute rheumatic fever he would consider that members of the streptococcus viridans group were the cause rather than a single streptococcus rheumaticus. The effort to put the responsibility for this disease on a single organism had not succeeded, and it had been shown by many that such a single organism did not exist. If the streptococcus viridans is taken away from acute rheumatic fever there is not much left. If this fever represents a disease induced by another organism, the lesions resulting from that disease are very mild in comparison with those induced by this viridans streptococcus. There is no question of the association of these forms of streptococci and the inflammatory lesions found in acute rheumatic fever. These organisms have

been isolated from the heart, the kidneys, and the urine, and during the attack they are present in the blood. In regard to Aschoff bodies in the heart they are present in certain inflammatory conditions. They are found in acute rheumatic fever, acute articular rheumatism, muscular rheumatism, and rheumatoid affections. Here the lesion in the heart is focal and develops in the vicinity of the nutrient vessels of the myocardium. Very often from the myocardial picture alone a diagnosis of a rheumatic affection could be made. Dr. Klotz showed some drawings and pictures of these Aschoff bodies.

In answer to Dr. Hunter's question, Dr. Klotz said that these chronic suppurative processes in the sinuses and other cavities may have or may not have a relationship to the subject of discussion. In other words suppose any chronic condition is present such as chronic tonsilitis, such an affection may be caused by many different kinds of organisms. Here in each variety of infection the lesion is not similar pathologically, and yet clinically it is tonsilitis. In this instance we are dealing with an ulceration in the deep crypts. These little ulcers are the ports of entry to the body for the different organisms that may be present.

Dr. Klotz in conclusion thanked the Fellows for this opportunity to appear before the Toronto Academy of Medicine. It was his first appearance and he appreciated very much the invitation to be present. He felt it an honour to be invited to take part in this discussion and this more particularly as Toronto was the home of his Alma Mater.

The president of the Academy, Dr. Herbert Hamilton, presented the thanks of the Fellows to Dr. Klotz for his excellent paper, and his most illuminating reply in his discussion. It was a pleasure indeed to convey to him the thanks of the Academy.

MONTREAL MEDICO-CHIRURGICAL SOCIETY

THE third regular meeting of the society was held Friday, November 7th, 1913, Dr. D. F. Gurd, president, in the chair.

LIVING CASE: Vincent's angina, Dr. Kenneth Cameron.

The case which I bring before you to-night is of much interest on account of the rarity of the disease, the unusual situation of the growth, and its occurrence in a person of this age. Vincent's

angina is characterised by brownish or greyish ulcero-membranous patches on the mucous membrane of the throat, usually the tonsils and the pillars of the fauces, in which are found two characteristic organisms, a long fusiform bacillus with pointed ends and a spirillum. The man, fifty-five years of age, came to the surgical out-door department of the Montreal General Hospital on October 28th, stating that for the past two weeks he had noticed a small growth on the roof of his mouth. Upon examination, a patch about the size of a ten cent piece was seen situated on the right side of the roof of the mouth in a line with the first bicuspid tooth. It was of a dirty greyish brown colour, of a soft velvety feel, not at all indurated, extending well above the healthy mucous membrane, from which it was separated by a deep fissure. No other spots were seen on the mouth or fauces. The teeth were decayed and the odour of the breath was extremely foetid, quite unlike anything I had ever before experienced. A swab was sent to the pathological laboratory for examination but was not sufficient to form the basis of a diagnosis. Three days later the membrane had spread over the whole of the hard palate, part of the soft, on the right side, and through a gap between the teeth of the buccal mucous membrane. Part of the growth was scraped away, leaving a raw bleeding surface. In this material numbers of the characteristic bacilli of Vincent's angina were found. Three days later the membrane had spread over the whole of the other side of the roof of the mouth and through a gap between the teeth on that side also, to the buccal mucous membrane. The place from where the patch had been curetted was again completely covered. Little active treatment has been carried out, so that the members of the society might have an opportunity of seeing this curious condition. The treatment is the local application of salvarsan, or the application of oxygen in the form of a mouth wash of peroxide of hydrogen. (N.B.—Subsequently, the membrane rapidly disappeared under the above treatment.)

DISCUSSION: Dr. Fraser B. Gurd: The organism of Vincent's angina has been the subject of a great deal of research during the past two or three years, and, even though I seem to be didactic in the matter, I think it would be of interest to mention one or two of the facts that, apparently, have been established regarding the organism. A great deal of work has been done in Chicago by Dr. Hektoen and by Ruth Tunncliffe and Dick. A certain amount of work has also been done by some of the Germans. These observers have established that the fusiform bacillus is the same organism as the spirillum. The organism can be cultivated with comparative ease under

strictly anærobic conditions in any media containing uncoagulated albumin. At the end of twenty-four hours the culture is made up entirely of bacilli, at the end of forty-eight hours of equal numbers of bacilli and spirochetes, and at the end of four or five days, and for several weeks, the culture is almost entirely spirochetes. In early lesions, the bacilli are much more frequently found; in older lesions the spirochetes, apparently, in almost pure culture. These investigators have also worked out this bacillary organism, the bacillus fusiformis, in other diseases than those of the mouth; Dick in empyema, gangrene of the lung, and Ruth Tunnicliffe in generalised septicæmia with thrombosis in vessels in various parts of the body where this culture was obtained. A similar organism was obtained from normal throats. It has been found impossible to infect animals with the simple injection, but by repeated injection the animals do succumb and their bodies are filled in the same way as by the *B. ærogenes*.

CASE REPORT: Pellagra, by Dr. H. A. Lafleur.

DISCUSSION: Dr. Fraser B. Gurd: I have with me a copy of a photograph which Dr. C. C. Bass, of New Orleans, was good enough to give me, and which will show the association of the lesion with the action of the sun. A fairly pronounced dermatitis of both hands is seen, but where the rings were worn the skin is perfectly normal. The impression in the south is that, not only does the patient suffer from a sunlight dermatitis, but the general constitutional condition is altered for the worse by exposure to sunlight or even diffuse daylight, and their patients are always happier by being kept in the dark. It does seem as if there were some substance in the body which responded to light in some injurious way. That the dermatitis is a sun dermatitis, I believe, is proven. That there is always some underlying feature associated with pellagra which predisposes the individual to the action of sunlight, in a way which the normal individual is not, seems probable.

Dr. J. G. Adami: I would like to call Dr. Lafleur's attention to the fact that the statement has been made that apparently the first recorded case of pellagra in North America is to be found in the mortality tables of the Province of Quebec many years ago. So far, I believe, it is unknown who made this diagnosis, or what were the facts of the case. It is curious, though, that it should have been there.

PATHOLOGICAL SPECIMENS: Dr. E. J. Mullally.

1. Unusual condition of a rib. Removed from a child of five years who contracted tonsillitis, which subsided after one week,

about the first of the present year. Two weeks later severe pain developed in chest, and in another week a swelling was noticed, red and fluctuating. It was incised and pus came away. The wound refused to heal and a sinus persisted for several months. The case was sent into hospital, the sinus cut down, and the rib removed. The rib shows a long sequestrum.

2. Fracture of the head of the radius. A male, aged nineteen fell eight or ten feet with both hands outspread, a fracture of the clavicle and severe injury to right elbow resulting. In hospital there was much doubt as to the exact condition in the elbow; it was cut down upon for the purpose of wiring a fracture and this unusual condition was found at the extreme end of the radius where it comes in contact with the humerus. The head of the radius is divided into three unequal segments; the two smaller pieces were very difficult to find, but the larger one remained in contact with the radius. The specimen shows what may often be the result of neglected and untreated conditions of the elbow joint; it is probable that an ankylosis might have developed here.

3. Epithelioma of lower jaw, or rather of mucous membrane attached to jaw. Removed at operation from a man seventy years of age. At about the age of sixty-seven, he had all his lower teeth removed and a plate substituted; it was loose and in time produced an irritation. At the end of eighteen months a swelling developed and after three years he came here for treatment. The thing was now a large malignant growth, ulcerating, and very foul-smelling; he begged for relief. The lower jaw was removed and shows this large epithelioma. It illustrates the well-known fact that constant irritation will induce malignant change in almost any situation.

4. Pyloric end of stomach removed from a woman aged sixty-four, who had suffered, off and on, from symptoms of stomach trouble for a number of years. Her cervix was removed for carcinoma three years ago. The stomach symptoms consisted of vague indefinite pains, and attacks of nausea but no vomiting. These attacks have increased in severity since September. In addition to this she suffered from what she called "bloated attacks," the stomach swelling up. When the stomach was washed out, fragments of meals taken a few days previously were removed. On the supposition that the condition was malignant, the stomach was opened and a hard mass found at the pylorus. It was removed and sections were examined, but did not prove to be carcinomatous; there is just a thickened layer of submucous tissue, fibrotic in nature, which gives one the impression of the condition known as linitis plastica,

or fibrosis of the stomach. This condition has been much written about and much discussed, and there has been great difference of opinion about it. There are at least two distinct forms, the localized and the general, and a form that is malignant and one that is non-malignant.

5. Thyroid, removed from an imbecile fifty years old on account of its mechanical effect of producing dyspnoea. The specimen shows two distinct things,—at the upper portion, there is a small area which has a foetal adenoma microscopic appearance and a larger area showing under the microscope a myxo-fibro-adenomatous condition. The association of an enlarged thyroid with pronounced mental disorder suggests the possibility of some connexion between the conditions. However, the history of the case is such as to exclude the possibility of the thyroid change as a causative factor, however much it may have contributed to increase the disturbed mental state. Another interesting feature of the specimen is the pronounced degenerative changes which are present; they account for the myxoedema changes which were noticed in the case.

PAPERS: 1. Mental defectives: history, etiology, signs and symptoms, diagnosis, prognosis, and treatment, by Dr. G. S. Mundie.

DISCUSSION: Dr. C. K. Russel: This discussion of Dr. Mundie's is very opportune, as I think that within the next year there will probably be an energetic movement on foot to make the people of Canada realise their responsibility in this matter. Mr. Alexander Johnston, in conversation with me, made the statement that it would be cheaper to the state to keep all feeble-minded women in the most expensive hotel in the city if in this way we could prevent them reproducing. I think it is time the people of Canada realised what mental deficiency really means in dollars and cents, to say nothing of the mental health of the community.

Dr. H. A. Sims: While agreeing absolutely with Dr. Mundie on the question of the treatment of these cases, I feel perhaps rather more optimistic in one respect, that is the question of environment. To adopt the view "that the environment of to-day is the heredity of to-morrow," except in so far as environment may influence the mating of defectives, we should have to accept the doctrine of the heredity of acquired characteristics, a rather drastic step it seems to me, especially in face of Weismann's mice. A point in favour of an optimistic view is the result of the segregation of the cretins of Aosta in Northern Italy. Up to 1890, this district was noted for its cretins who could be seen lining the roads and begging from the

passers-by at all times. In 1890 they were sexually segregated, no other prophylactic measure being taken, and by 1910 Jordan tells us "there were but four, one old cretin and three demi-cretins" in the whole district.

2. The clinical significance of blood pressure. Different instruments used; different factors involved in maintaining blood pressure; maximum or systolic pressure; minimum or diastolic pressure; errors, instrumental and personal; normal pressures; pressures in disease, their significance; methods employed in lowering pressure; conclusions. By Dr. J. Kaufmann.

DISCUSSION: Dr. F. R. Miller: I listened to Dr. Kaufmann's description of the manometers with great interest. Those used in physiology in experiments on animals have been greatly modified, first by Hürthle, who got away from the old mercurial manometer, and lately by Professor Frank, of Munich, who has still further improved the method. I think that it may, ultimately, be possible to combine some of these manometers with those of the sphygmomanometer.

Dr. W. S. Morrow : I am afraid that if I express my views some of the members will think that I am a terrible heretic. A favourite statement of mine is that the sphygmomanometer is responsible for more deaths than the guillotine, and I feel that this is the case. A great many men get hold of a sphygmomanometer, find that the blood pressure is up high, and immediately start to get it down. When they have succeeded the patient dies. I consider that the most valuable lesson to be got from Dr. Kaufmann's paper is that the blood pressure is a very complex thing. Dr. Kaufmann was unable to cover all the ground in half an hour for it would take a great many hours to cover it. Another thing is that any man who takes up the directions accompanying the various instruments and expects to get results therefrom, is doing a very wrong thing. If I find a high blood pressure, I know that something is wrong, but what is wrong my instrument does not tell me; I have to find it out by other means. I do not consider that a high pressure proves the heart is beating strongly; there may be a weak circulation; the brain may be suffering from insufficient circulation or very poor blood and may be sending out impulses to the vaso motor nerves to raise the pressure in the endeavour to get up enough blood to the brain. In cases where I have succeeded in getting pressure down it has generally been by treating heart failure. When a man finds a blood pressure up above normal he should examine the kidneys by all means possible. In the majority of cases, the kidneys are

diseased, and that is the first thing to correct. The next thing is to examine the heart very carefully and to try and determine whether it is working within its strength, or whether it is fatigued. You may find that the heart is not working easily within itself and needs supporting. Next we must go into the whole history of what the patient eats, drinks and does. Briefly, to find out the cause of high blood pressure, we must make a thorough and exhaustive examination and make a careful diagnosis by exclusion.

The fourth regular meeting of the Society was held Friday evening, November 21st, 1913, Dr. D. F. Gurd, president, in the chair.

PATHOLOGICAL SPECIMEN: Thrombus, exhibited by Dr. L. H. McKim, from a woman aged thirty-four, who had been delivered of a still-born child. Puerperium normal, but three months afterwards she was taken ill with chills which occurred off and on for some time. Entered hospital, and died six months after delivery. Shortly after entering hospital she developed swelling of the legs with albumin and casts in urine; this disappeared about ten days before her death. The autopsy showed, as the immediate cause of death, a broncho-pneumonia. The specimen shows a thrombus which involves both the iliac veins. On the right side, the lumen is partially, and on the left side, completely blocked. The thrombus is attached solely at the bifurcation and about 4 cm. hangs free in the inferior vena cava. There is a small recent thrombus higher up. The top of the thrombus is round, and shows no sign of any portion having broken off. The heart and lungs showed no emboli.

CASE REPORT: Renal calculus, by Dr. J. M. Elder. The specimen was from a man aged thirty-seven, who came into the hospital last March, complaining of pain in the right side. He had pus in the urine; had never had chills or fever, but had pain sufficient to cause rather marked insomnia, sleeping only three hours at night. Fourteen years previously he had been run over by a wagon, and his right side hurt. An x-ray was taken which showed practically what is seen in the kidney to-night. The left kidney was perfectly normal. There are a great number of calculi, a whole chain in the lower pole extending almost down to the crest of the ilium, and some much larger stones in the upper pole. The patient was told that he had renal calculus, and was advised to have the stones removed. It was supposed that these stones were phosphatic as it did not seem possible to have so many on any

other supposition. Dr. Wilkins, however, who took the *x*-ray plates, said that the shadow was distinctly that of oxalates, and this proved to be the case. The patient went home to settle his affairs and returned on November 6th, when another skiagram was taken which showed exactly the same picture. Two intensified plates of the upper and lower poles were also taken which rendered the picture much clearer. Having demonstrated, without doubt, that the other kidney was competent, we operated. The operation presented no particular difficulty, except to the surgeon, as I had to resect the last rib in order to get out this large kidney. The wound healed by primary union, and he is going home to-morrow, with no temperature. He still has oxalates in his urine and I have warned him as to his diet. Dr. L. H. McKim described the specimen which had been hardened in formalin before being opened. It showed a large calculus in the pelvis, and a series of smaller calculi in the lower half. Dr. McKim also exhibited a test tube containing the fluid found in the interior of the kidney, which was quite pus-like in quality.

DISCUSSION: Dr. W. F. Hamilton: A few days ago I made the remark that the *x*-ray was responsible for some very wonderful diagnoses, little thinking that I should see the fact illustrated by this particular case. Dr. Wilkins is to be congratulated on his diagnosis. Another thing about the *x*-ray in this region is the demonstration of the presence of pus.

Dr. F. R. England: I would like to know why phosphates were not deposited upon that oxalate stone in the presence of pus and probably a certain amount of alkaline urine.

Dr. J. M. Elder: I have no explanation to offer at all as to the nature of the stone as I fully expected it to be phosphatic. Just why those stones are as clear and sharply cut oxalates as they are I do not know.

2. Pleuritic adhesion at site of external wound. Dr. J. M. Elder. Woman, aged sixty-six, had her breast amputated by Dr. Bazin on August 13th, the usual complete operation being done and everything taken away. She was in miserable health; without any septic reason, the flaps sloughed, and she had a large but healthy granulating sore, and there was some uncertainty as to how we could cover this up. Her recuperative power was very poor, skin grafting seemed hopeless, and plastic surgery did not give us much more hope. One day she was going about the ward as usual, feeling miserable, but without any temperature, when I noticed that she was having a severe rigor. She was put to bed at once

and the temperature suddenly shot up to 104°, and she was very ill for several days. At this time we thought she was suffering from broncho-pneumonia. She died on November 5th. She had from time to time complained of some pain in the right shoulder on moving the arm, but the operation seemed to explain this. However, the autopsy showed a septic (streptococcic) arthritis of the right shoulder. Inside the lungs were a great many nodules of secondary carcinoma, but that did not kill her; there was nothing septic in the lung itself. The source of sepsis was in the right shoulder joint, which had been missed entirely clinically. The interesting thing about this is that the question is raised, that in these extensive operations on the breast, where so much chest wall is uncovered, any sepsis occurring there may provoke a septic pleurisy. Can one get a direct extension pleuritis in this way? Time and again the condition has been met with, and it seems to me that in these cases we are always running the risk of septic pleuritis. You will see in the specimen that the adhesions corresponded exactly to the round ulcerated portion where the breast was. Since this case has come under my notice I have looked up three operations that I have done within the last two years, and I find that in all there is present a marked pleuritic friction though all had healed per primam. I merely raise this question, I do not know definitely that such is the result.

Dr. L. H. McKim: At the autopsy we found a large area devoid of skin, corresponding roughly to the area of the breast. There was a very thin epithelial covering but no evidence of any acute process going on there. There was a septic arthritis of the right shoulder joint. Numerous carcinoma nodules were found in the lungs, most numerous on the side opposite to the operation; the peribronchial glands were also extensively involved. With one hand in the pleural cavity one could accurately mark out the granulating area on the skin surface, by means of the pleuritic adhesions between the lung and the chest wall.

Dr. F. R. England: This is certainly an important case, and one which will arouse the interest of the surgeon. Dr. Elder suggests the possibility or even the likelihood of pleuritis occurring after an extensive operation for the removal of the breast. I can understand how a localized pleurisy might easily occur in a case where there was a large granulating wound which had become infected, but in a case where healing was by primary union it is not so easy to explain. I would like to ask Dr. Elder whether the metastases occurred in the lung itself or in the bronchial glands,

and also in what quadrant of the breast the original growth was situated as this has an important bearing on metastases occurring in the lung.

Dr. L. H. McKim: In answer to Dr. England I would say that both the peribronchial glands and the substance of the lung itself were involved; very much the larger foci were found in the lung; the peribronchial glands were infiltrated, but to a less extent. The larger foci were on the opposite side to that from which the breast was removed.

Dr. J. M. Elder: The quadrant (if you can divide the breast into quadrants) in which the growth was situated was the upper inner, the most dangerous situation, as the lymphatics run directly into the thorax. If the growth be in the other quadrants there is much more hope of removing the affected lymphatics with the tumour.

3. Intussusception of Meckel's diverticulum, by Dr. W. H. P. Hill. Dr. H. B. Cushing gave the history: The specimen was obtained from a boy three years of age who was sent into the Children's Memorial Hospital by Dr. Charles Gurd with a history of vomiting three days before admission. The child had had at least one similar attack some months before. On September 25th, present attack started without adequate cause with some abdominal pain; bowels moved freely; vomiting continued during next three days, and after first day no movement of bowels. On fourth day entered hospital; temperature 99°, pulse 100; no severe pain, but vomited at intervals anything taken by mouth. Enema given brought away flatus stained with fæces, but formed stool, also bloody mucus, and a history was given of passing similar mucus during the previous two days. Clinically the question was whether the boy had an intussusception or not. Against this was the fact that he had previous attacks from which he had spontaneously recovered; that after four days he was still in good condition; there was no abdominal distension, no mass palpable, no very severe pain apparently at any time, no tenesmus or straining, and enemas brought away flatus and a small amount of fæces. Since his condition was so good we decided to wait. On the fifth day he still vomited a little, but seemed much better; the following day he took full liquids, and had had no vomiting for twenty-four hours, but we could not get the bowels to move satisfactorily. On the afternoon of the sixth day he became suddenly worse, started vomiting again and enemas brought away no flatus, and, as there

was evidently a complete obstruction, Dr. Hill operated the following morning.

Dr. W. H. P. Hill: The abdomen showed signs of tenderness on the right side just below the liver; there was distinct resistance and under the anæsthetic a well defined mass was palpable. An incision was made opposite the tumour through the sheath of the right rectus, and we found the mass to be an intussusception. It was readily reduced. About two feet from the ileo-cæcal valve we discovered a second intussusception in a Meckel's diverticulum. The diverticulum and four inches of the bowel opposite to it were black and lustreless. This was resected and an end to end anastomosis done. The child made a good recovery. The specimen shows the mucous membrane of the diverticulum projecting into the bowel, and almost completely obstructing it. The serous coat has given way, evidently due to the extensive œdema that was present.

Dr. A. D. Blackader: This is one of those interesting cases in children which very often mislead the best of surgeons and I trust that Dr. Hill will report this case in full in one of our journals.

Dr. J. M. Elder: This is just another illustration of the well-known fact that one of the main causes of intussusception is a tumour. Here you had the Meckel's diverticulum which produced a tumour and the part of the bowel below tried to swallow the tumour. Cases of Meckel's diverticulum are not common, and intussusception of a Meckel's diverticulum is very uncommon.

Dr. A. H. Pirie: I would like to ask if the contents of the stomach were vomited.

Dr. H. B. Cushing: There was no definite fæcal vomiting, but green bile-stained fluid only.

Dr. F. S. Jackson: I would like to express my appreciation of the way in which Dr. Hill did the operation; it was done rapidly, and there were absolutely no untoward results.

PAPER: Treatment of heart failure, by Dr. W. S. Morrow: In his paper Dr. Morrow touched on the following points: Functional diagnosis—cardiac insufficiency; failure of contractility and tonicity, and their treatment; treatment of the cause; congenital defect, rheumatism, syphilis, influenza, nephritis, arterial hypertension, obesity, arrhythmia, disturbances of excitability—causes of functional disorders—organic, toxic, physical strain, sexual, emotional, thyroid, digestive, neurasthenia.

DISCUSSION: Dr. W. F. Hamilton: There are two points which I would like to discuss. First, the frequent difficulty in

separating the contractility failure from the tonicity failure causes. As a matter of fact I do not think they can be separated as readily as would appear from Dr. Morrow's remarks. It seems to me that where there is a failure of the one there is in some degree a failure of the other. At all events the failure of tonicity can scarcely be considered apart from the failure of contractility, and contractility failure leads in most cases to tonicity failure. One cannot doubt, however, that there are cases in which death ensues where no failure of tonicity can be demonstrated after death. But I am speaking of a larger class of heart failure cases which passed through the phases of failure of contractility and failure of tonicity, and I maintain that the recognition of each failure is not always easy. The features blend and the sharpness of definition is wanting. I would recall to the minds of several in this meeting the story of a patient who was shown here some years ago. A striking sign, you may remember, was a loud murmur, audible many feet away from the chest. The patient was the subject of both aortic and mitral disease, often complaining of thoracic and arm pain. His heart was much enlarged, both to the right and left. Gradually he became oedematous; the liver enlarged and cyanosis became marked. As these changes were recognized his distress lessened, and his pain ceased entirely; the contractility failed, the tonicity failed, and comparative comfort was enjoyed. This case is but one illustrating a well recognized change in cardiac failure, and one also, I take it, that illustrates my contention that the path to failure of tonicity is through failure of contractility. This path is sometimes short and sometimes long. The second point is the success following the use of adrenalin. Dr. Morrow's results are nothing short of phenomenal. I have never seen such cases nor do I recall any instance of like success. The method of administering the remedy by the mouth is rather exceptional, I think. Finally, I had hoped to hear of that form of cardiac failure so often met with in general practice, the failure found in acute infections. This is a most important matter to all of us who treat pneumonia, typhoid, diphtheria, etc. These cases illustrate an urgency even greater than those due to tobacco, coffee, and other heart poisons, and it is very desirable to have more light regarding the remedies useful in such emergency.

Dr. W. S. Morrow: The first question raised by Dr. Hamilton, whether failure of contractility and tonicity were perhaps practically different stages of one disease or disturbance, is one which I cannot altogether sanction; and he himself has supplied facts to refute it

in the case he mentioned, where the symptoms of distress were probably due to failure of contractility, whereas, when a leakage developed, this passed away and the man showed circulatory disturbances with veins distended, suggesting failure of tonicity. It is a very common experience that a patient, at a certain stage, will show anginal symptoms and cardiac asthma, the valves being competent; then they will give way and leakage will occur, the pressure in the ventricles will fall and the symptoms of failure of contractility disappear. MacKenzie explains the symptoms attending a failure of contractility by reminding us that in a hollow viscus we get colic when the muscle is contracting against too great resistance. In renal or hepatic colic the pain is not due to the injury to the mucous membrane, it is not sufficiently sensitive, it is rather due to the contraction of the muscles against resistance, which for some reason is characteristic of hollow viscera. The same with the heart, and here we recognize it as an anginal attack, and it often shows itself objectively in the variation of the pulse, known as *pulsus alternans*. It has been noted that when the mitral valves become incompetent and leakage occurs, the patient may get worse, but his pains will disappear; in other words the pressure is no longer sufficient to produce this colic; but we have other symptoms due to the back leakage and these may lead to kidney congestion and ultimately to death. I think there is a distinction in these two conditions even if they follow one another, and we may see it in the remedies that do good. Where we have the symptoms of angina, *digitalis* as a rule does not do good; whereas in the case of a big dilated heart the probability is on the whole that *digitalis* will do good. Sometimes, I admit, the two conditions are combined, as in a heart with leaking valves and perhaps coronary sclerosis.

The next point was the question of adrenalin, I can only say with reference to it that I have been using it for ten or twelve years in hundreds of cases and have had a great number of successes; some in fact who seemed almost moribund have recovered. I have been disappointed with the action of adrenalin in many cases but in a great number, including cases of failure of contractility and hyperthyroidism, I have noted beneficial action. I remember one case in particular, that of an old woman, with enlarged thyroid and dilated heart, where the heart came down considerably in size and there was much improvement after a month's treatment with suprarenal tablets.

As to the condition of the heart in the acute infections, I omitted this because my paper was based, with few exceptions,

upon my own experience, and I have had very little experience with the acute infections compared to many of the hospital men, certainly not enough to take up the question from this point. I still maintain that contractility and tonicity ought to be separated, that they are not identical; one is shown by pain due to contraction against resistance, the other causes a combination of congestive phenomena due to backward leakage and the circulation not being carried on properly, and they require different treatment.

MONTREAL MEDICO-CHIRURGICAL SOCIETY

A SPECIAL meeting of the society was held in the society's rooms, on Friday afternoon, December 5th, at five o'clock, Dr. D. F. Gurd in the chair. The society was addressed by Dr. Harvey Cushing, professor of surgery in Harvard University, on "A report on a series of ganglion operations for trigeminal neuralgia."

KENT COUNTY HEALTH OFFICERS' ASSOCIATION

At a meeting held at Chatham, on December 2nd, the Kent County Health Officers' Association was formed. The objects of the association are to promote the general health of the county and to study the sanitation. The president is Dr. C. R. Charteris, Chatham; the vice-president is Dr. Hanks, of Blenheim, and Dr. Reid, of Merlin, is the secretary.

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The Canadian Medical Association

Annual Meeting, 1914, St. John, N.B., July 7th, 8th, 9th and 10th

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EDITOR

Andrew Macphail, 216 Peel St., Montreal.

Assistant to the Editor, W. W. Francis, 836 University St., Montreal.